OUR FRIEND THE ZEBRA MUSSEL

FALL/WINTER 1996

ROTUNDA

the magazine of the Royal Ontario Museum

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CRAZY FOR TRUFFLES

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ROTUNDA STAFF
Sandra Shaul, *Executive Editor*
Peter Enneson Design, *Design and Production*

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Editor's Note

In parts of the world where they live, bears have made an indelible stamp on the human psyche. We grow up with our cuddly, beloved teddy and panda bears, empathize with dear Goldilocks when she is confronted by the fearsome ursine consumers of porridge, and hope that bear sightings on a hiking or camping expedition take place from a great distance. In some cultures bear parts are used as amulets or consumed for courage and strength. Bears are regarded with fear and respect and as strong, brave, and protective, although for rural dwellers and campers they can be a pest.

The physical appearance of bears is even more wide-ranging and has led to many problems for scientific classification. For example, at the turn of this century, 232 names had been applied to supposed species or subspecies of brown bears living across North America, Europe, and Asia. Modern genetic research now shows that in fact there are only eight species of all living bears worldwide. In the cover story Judith Eger and Mark Engstrom explain the complex evolutionary history of bears and the difficulties of drawing a simple bear family tree.

Dr. Herman Herzog Levy was one of the most generous benefactors in the history of the Royal Ontario Museum. Not only did he make major donations to the Far Eastern and European collections during his lifetime, but he also left the Museum a bequest of more than $14 million to collect in specified areas of Asian art. His bequest has made it possible for the Museum to acquire some true masterpieces and to flesh out areas of the collections. In a tribute to Mr. Levy, Lee-Anne Jack writes about the man and his passion for collecting, followed by a photo essay highlighting acquisitions made through the bequest.

Are zebra mussels a menace? Not according to David Barr, a biologist specializing in invertebrates. They represent change—good and bad—to the environment. None of the havoc forecast five to six years ago has come about. Some aquatic species have thrived either because of cleaner environments brought about by the voracious appetites of zebra mussels or because the mussels themselves have become a copious food source. However, pearly mussels, whose shells were favourite collectibles of young cottagers, are one species that has virtually vanished from the Great Lakes. Barr discusses how species invade an environment and what measures should be taken against damage.

The ROM's archaeological interest in Nubia, the ancient region represented today by southern Egypt and northern Sudan, began with two of the institution's founders, Charles Trick Currelly and Edmund Walker. For more than a decade, research in the area has been conducted by ROM archaeologist Krzysztof Grzymski, who has written about what his crew has found and learned. The ROM's Nubian project has been named an official activity of the United Nation's Decade for Cultural Development.

For reasons of economy, with this fall/winter issue *Rotunda* will be published three times per year—October, February, and June, but the standards that you have come to expect will be maintained. So even though it is still mid-autumn, I would like to wish you a happy and safe holiday season, and we'll meet again as spring approaches.

Sandra Shaul

SANDRA SHAUL

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A *verre de Nevers* polychrome glass tableau of the Nativity, early 18th century, was purchased by the Royal Ontario Museum through the J. A. H. Brocklebank Fund.

PHOTOGRAPH COURTESY CHRISTIE'S, NEW YORK

Museum Purchases Rare Glass Tableau

By the late 16th century, lampwork was one of the few areas in which glassmakers could individually excel. Glass, usually opaque and formed into rods, was manipulated by heating it with a small flame "at-the-lamp." Nevers, France, a small town located south of Paris, was one of the major centres for this type of work. The Royal Ontario Museum is fortunate to have recently acquired, with the assistance of the J. A. H. Brocklebank Fund, a *verre de Nevers* polychrome glass tableau of the Nativity, dating from the early 18th century.

The glass industry of Nevers began in the 16th century when Ludovico Gonzaga, Duke of Mantua, married Henrietta of Cleves to become Duke of Nevers. He brought with him Italian glassmakers of the Saroldi family from Altare. Altare, an important glassmaking centre located near Genova, had rivalled the glassmaking of Venice and Murano since the 9th century. However, unlike their rivals who sought to enforce secrecy, the Altarists had guilds and encouraged the spread of glassmaking.

Nevers glassmakers specialized in the production of small glass figures, first documented in 1605. They transformed opaque fusible glass into detailed anatomical features and fabrics. The glass rods, softened at-the-lamp, were manipulated by pincers and other instruments onto copper wire frames. Only the colour combinations of the glass and the dexterity of the artist limited the finished product.

The *tour de force* of lampwork was the three-dimensional scenic group or tableau, which depicted a combination of religious and pastoral scenes with numerous glass figures

posed in a grotto made of a wooden form coated with coloured papers and sometimes feathers. The fragile tableaux were protected in wood-framed glass boxes. Over time the boxes collapsed, exposing their contents to dirt, damage, and insects, and eventually the glass figures would be removed.

The majority of the Nevers figures were produced during the late 17th and 18th centuries by the Italian glassmakers, their descendants, and local French glassmakers. A few names such as Jean Prestereau and his son Léon are recorded, but today their work cannot be identified. The popularity of the figures inspired glassmakers in Italy, Germany, England, and Spain to follow suit. They produced copies, which are not readily distinguishable or easily dated.

Until the ROM's recent purchase from a major New York auction house, the Museum owned one small glass object from Nevers. The figure of Jesus, purchased by the Museum in 1969, is on display in the glass study room in the north wing of the Samuel European Galleries. Consigned from a South American collection, the tableau is one of the most elaborate and complex ever produced. Measuring 5.9 cm high, 7.9 cm wide, and 4.7 cm deep, the landscape is populated with numerous figures and animals, created from lampwork and mould-blown techniques, representing scenes from the Bible. Centrally placed under the town of Bethlehem is the Nativity with Holy Family. Around this ensemble there are depictions of the Three Magi and the Annunciation to the Shepherds. Scenes from the Massacre of the Innocents are found in two side grottos.

Considering that the protective box must have been lost years ago, the tableau is in a remarkable state of preservation. Some damage has occurred to the fragile three-dimensional landscape, and some of the glass figures have been damaged and repaired in the past. However, the tableau is still one of the most imposing examples of this art in existence. Before it can be displayed in the Museum galleries it will have to be carefully conserved and cleaned by the Museum's Conservation Department.

Mr. Brocklebank, who established the fund that has made the tableau purchase possible, was passionately fond of paperweights. He purchased numerous glass weights with lampwork but never was able to acquire an important early example for his collection of early classic French and contemporary American paperweights. His collection, generously donated to the Museum in 1984, is on display. Because of his fund, the ROM will soon be able to show one of the most fascinating aspects of the French glassmaking industry.

BRIAN MUSSELWHITE
Brian Musselwhite is a curatorial assistant in the Department of Western Art and Culture

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In the February issue of *Rotunda*...

What is *Au Courant* in Canadian Fashion

By Alexandra Palmer

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Selected works released from the private collection of the artist

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Henri Dussolras, **truffiste,** *bites into a deceptive summer truffle.*

PHOTOGRAPH BY JEREMY FERGUSON

The Black Queen of Cuisine

My first taste of the truffle was in the Dordogne, Perigord of yore, the historic heart of *gastronomie* in France. My wife and I were dining at the 14th-century Chateau de la Treyne overlooking the Dordogne River. We had been exposed to slivers of truffle in the past, and wound up wondering what all the fuss was about, but now we had opted for an unpriced supplement of black truffle in puff pastry. The earth moved under us. This truffle was dizzyingly aromatic, earthy, pungent, and completely unlike anything else we had ever encountered. Settling accounts next day, we were presented with a bill of $40 apiece. Normally, I would have slipped into a coma. Instead I wanted to shout *"Salut!"*

The Chateau's truffle was the real thing, *tuber mylanosporum*, alias the "black queen" of cuisine. It was truffle royalty, the one that relegates all other 69 varieties of the celestial fungus to mere vassals. It ranks above caviar and alongside foie gras among gastrocrats. One of the few lucid descriptions of its aroma comes from William Makepeace Thackeray, who called it "something musky, fiery, savoury, mysterious—a hot, drowsy smell that lulls the senses and yet inflames them."

For once, the gourmandizing Romans were not the first to get there. Author Waverly Root says truffles were a delicacy in Mesopotamia in 1800 BC. The ancient Egyptians celebrated the truffle with profound sophistication, cooking it as a kind of *confit* in goose fat. The Greeks and Romans detected aphrodisia in it, an association which lingers to this day (perhaps because the musky aroma of the truffle is caused by the same sex pheromone found in male sweat: sorry, girls).

In the Middle Ages, the truffle was assailed as the work of the devil and almost literally stamped out. Like its aphrodisiac peer, the oyster, it bounced back in the Renaissance. It was during the reign of Louis XIV—the monarch consumed a pound a day—that the truffle became enshrined forever in the pantheon of foodiedom. The French have pretty well patented *le truffe* in spite of upstart competition from Italy, Spain, and lately, China.

The truffle is a subterranean fungus that is found around certain oak trees in soil so poor that it was once believed truffles grew only where lightning had struck. It can be rounded or oblong, black or white. Some 32 varieties grow in Europe.

The Italian white truffle can be piquant and the grey truffle found in Champagne and Burgundy is not to be scoffed at, but it is that round, ripe black truffle of Perigord that takes you by the olfactory sense and has its way with you before you've sunk your teeth into it. Yes, the black queen. Curtsy before consuming.

Pigs and boars adore the fungus, but if you imagine truffle hunters —*truffistes*—roaming the woods with ecstatic swine, you're out of date. Nowadays truffles are rooted out not by hogs, but dogs (mongrels are considered better candidates than pedigrees), and also a species of fly that lays its larvae on truffles. One day, we found ourselves hunting with Henri Dussolras, who sports the traditional cap and sack of the *truffiste*. His sidekick was Kiki, a mutt with a Cyrano snout for the good things in life.

"Cherche, Kiki, cherche!" commanded Henri as we forged through a stand of oak trees. Kiki was more interested in territorial claims. "No pee pee, Kiki!" cried Henri. The dog burrowed his nose several centimetres into the soil and emerged with a large grey-black lump. Kiki was rewarded with a chunk of salami and thought that he had made chumps of us. Maybe he *had*, for it was May and what we had found was a summer truffle, a lookalike for the real thing but lacking completely in aroma or flavour.

Unfortunately for truffle-lovers, deforestation continues to take a terrible toll. Before World War I, the Dordogne region alone produced 1800 tonnes of truffles a year. Now the *national* output is fewer than 20 tonnes. Every so often someone trumpets a breakthrough in the cultivation of the traditionally stubborn black truffle, with talk of truffles flooding the market and prices zigzagging downwards. Embarrassment follows.

Truffles turn in bravura performances whether sliced atop *terrine de foie gras* or chopped into a green salad, or as sauce for beef or lamb. The French, taking it to the limit, have a recipe for truffle *ice cream.*

Like caviar, there should always be plenty. The playwright Colette put in her two francs' worth with: "To hell with thin slices, strips, trimmings, and peelings of truffles! Is it not possible to like them for themselves? Indeed, the true connoisseur enjoys truffles whole and fresh, either raw, with butter and salad, or cooked (in embers, braised with white wine or Champagne, or in a puff pastry case)." I'll vouch for that one, Madame.

In Toronto, chef Jean-Pierre Challet has a powerful way with truffled mashed or fried potatoes, elevating the lowly spud to superstar. At Truffles in the Four Seasons Hotel, Xavier Deshayes guarantees the room lives up to its name with a signature spaghettini sauced in black truffle, salad of warm goat cheese with truffles, and sensational lamb and venison sauced in truffles.

Tinned truffles have been around for a long time, but I've never eaten one worth the effort. Brian McKenna of Fresh Herbs from France imports a kickline of products—fresh truffles, truffle oil, and truffle juice—sold at high-end establishments, where the price of fresh white truffle in season can soar to $3000 a kilo. The oil may be user-friendlier. Dab a little on your finger and taste. At first, there is nothing, then an aftershock, an explosion of flavour to send the palate reeling.

I don't have much envy, but what I do have I'll reserve for Marc Nadeau of The Wine Establishment, the company that sells wine accessories. Not long ago, Nadeau was invited to help a party of eight demolish a monstrous 1140-gram truffle, maybe the largest ever consumed in Hogtown. The evening's agenda began with risotto and fine old Bordeaux. It finished with the participants, having exhausted classical approaches, shaving the truffle over *popcorn.*

The recipe that follows is the signature dish of Truffles, the superb dining room of the Four Seasons Hotel, Toronto. It is always available and surprisingly easy to prepare.

SPAGHETTINI WITH PERIGORD BLACK GOLD, TRUFFLE EMULSION SAUCE

Ingredients

- 160 g (6 oz) spaghettini
- truffle cream sauce (recipe follows)
- 4 drops truffle oil
- 16 very thin slices black truffle
- 30 g (2 tbsp) butter
- 4 sprigs chervil
- salt and pepper to taste

Method

Place the spaghettini in boiling water, cook for two minutes and drain. In a large saucepan, combine half of the truffle cream sauce with the pasta. Boil for one minute and then add the truffle oil. Toss. In a separate saucepan, bring the remaining truffle cream sauce to a boil, and then pour it into a blender on medium speed. Add the butter and blend until foamy. Toss the pasta mixture with the blended sauce, then arrange the spaghettini on four appetizer plates. Garnish each plate with a sprig of chervil and four slices of black truffle. Serves four. For main course servings, just increase the amount of pasta; the sauce is already generous.

TRUFFLE CREAM SAUCE

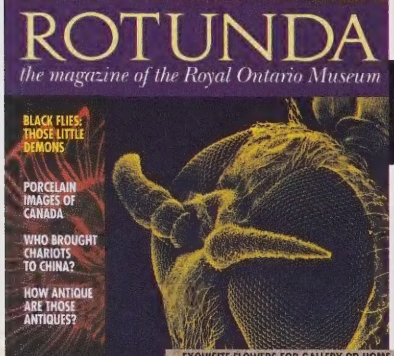
Ingredients

- 1/2 litre (2 cups) chicken stock (can be commercial broth or bouillon)
- 1/2 litre (2 cups) 35% cream
- 2 g (1/2 tsp) truffle trimmings or peelings
- salt and pepper to taste

Method

In a large saucepan, boil chicken stock until reduced by a third. Add the cream and truffle trimmings. Continue simmering until the stock has again reduced by half, then strain.

JEREMY FERGUSON
Jeremy Ferguson writes about food and travel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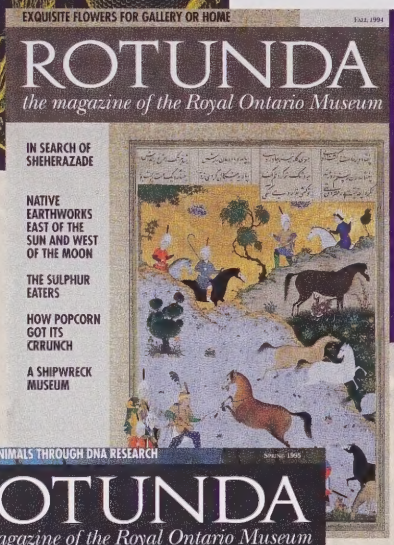
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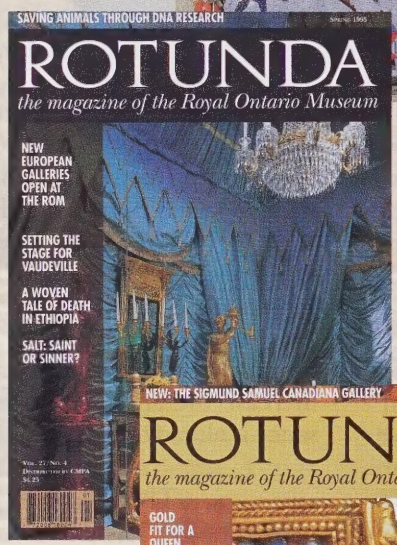
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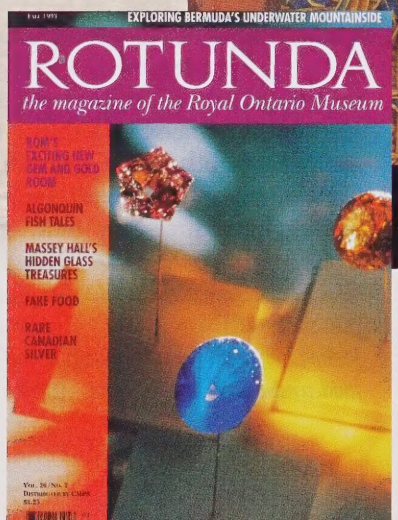

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Downgraded from a threat to a mere nuisance, the zebra mussel also has many positive attributes

Our Friend The Zebra Mussel

A native clam is partially covered with zebra mussels, newcomers to North American waters.

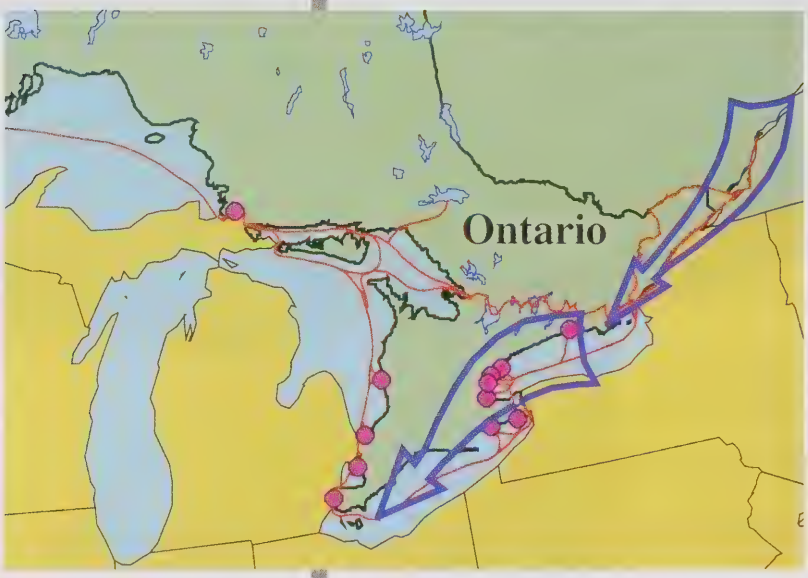
FOUR OR FIVE YEARS AGO ZEBRA MUSSELS WERE PUBLICIZED as the greatest crisis to hit the Great Lakes since the last glaciation. The small, bivalved molluscs were introduced into the waterways from bilge water discharged from European ships. They proved to be incredibly prolific and stuck like glue, often in dense masses, to anything solid under water.

DAVID W. BARR

David Barr is a former curator of invertebrate zoology at the Royal Ontario Museum

The invasion pattern of freshwater

The arrows indicate the invasion routes used by Ontario freshwater pearly mussel fauna to re-enter the province in the 10,000 years since the last glaciation.



pearly mussel contrasts with the

The arrows indicate the probable route into Ontario taken by zebra mussels. Principal shipping routes and the major commercial ports on the Great Lakes are shown.

Journalists (and some environmentalists) raised the spectre of reduced water and power supply, plant shutdowns, and astronomical increases in rates to consumers. The public came to think of the zebra mussel, or *Dreissena polymorpha*, as the scourge of the Great Lakes.

In the ensuing years, did the mussels disappear or have they survived and thrived? What impact have they had? Is anyone still concerned? The short answer is that none of the most dire predictions came about. Water and power plants are still operative. The spawning of commercial fisheries was not disrupted. The cost of electricity did not double overnight. Drinking water is still readily available. No Ontario lake is completely covered with zebra mussels from shore to shore. But the invaders have spread mightily and are undeniably still here.

Zebra mussels are now a part of many Ontario freshwater habitats where they did not previously occur, but the results have not been uniformly negative. The mussels have been subjected to intensive monitoring and research, resulting in at least as many new questions as answers. Today's issues surrounding zebra mussels are different from those of seven or eight years ago when the alarm was first raised. Now scientists want to know what is likely to happen to the species in North America over the next 10 to 20 years, the effect the mussels will have on overall aquatic ecosystems, and the incremental costs of control. They are also investigating a new mussel invader called the quagga.

A lot more is now known about the origins and biology of zebra mussels than was known in 1988, when they were first discovered. Apparently the zebra mussel originated somewhere near the Caspian Sea. By the early 19th century, however, it began to expand its range into central Europe. This expansion coincided with the growth of the Industrial Revolution, the building of extensive canal systems, and the related growth of transportation and commerce by inland vessels. Most of Europe has a climate hospitable to the mussels so that they are widespread, and biologists in Poland and Germany have had up to 150 years of experience with the species.

European scientists have discovered that colonizing zebra mussels rapidly become a natural element in the systems they invade. They are a new element, and they change the way the ecosystems work, but they do not always become the dominant element in the fauna. Although during the first few years of an invasion the number of zebra mussels may climb very high, it almost always declines a few years later. And they do not "destroy" the habitats, they just make them

MAPS COURTESY DAVID BARR; PHOTOGRAPH (PREVIOUS PAGE) FROM THE ONTARIO MINISTRY OF NATURAL RESOURCES

different. In fact, zebra mussels disappear when habitats are truly destroyed by increased pollution from heavy metals or agricultural nutrients. In France, zebra mussels are even used as biological indicators of acute, sub-acute, and chronic pollution and of the bioavailability of a wide range of trace, water-borne toxins.

In the Netherlands, zebra mussels are recognized as a significant source of food for other wildlife such as various species of ducks and fishes. They are also preyed upon by other invertebrates such as crayfishes and leeches, which in turn serve as food for aquatic birds and freshwater fishes. Europeans long ago noticed how effective zebra mussels are at filtering and clearing turbid water. So in the Netherlands experiments have been carried out to find a way to use them as a natural control for water clarity and as a biological means for filtering out suspended toxins.

Although evidence from laboratory studies in North America is just beginning to accumulate, scientists do have a pretty good picture of just where and how fast the zebra mussel has spread since reaching the Great Lakes' fair shores. Scientists now estimate that the original North American release of the species probably occurred in Lake St. Clair, perhaps as early as 1985. By the time mussels were discovered in 1988 they were already well established in Lake St. Clair and also around the western end of Lake Erie. By 1991 there were extensive colonies in Lake Ontario and at various spots around Lake Huron and Georgian Bay as well as in the Trent-Severn Waterway and the upper St. Lawrence River. In the United States the mussels had also spread to the Erie Canal and Hudson River systems in New York State and through tributaries of the upper Mississippi River.

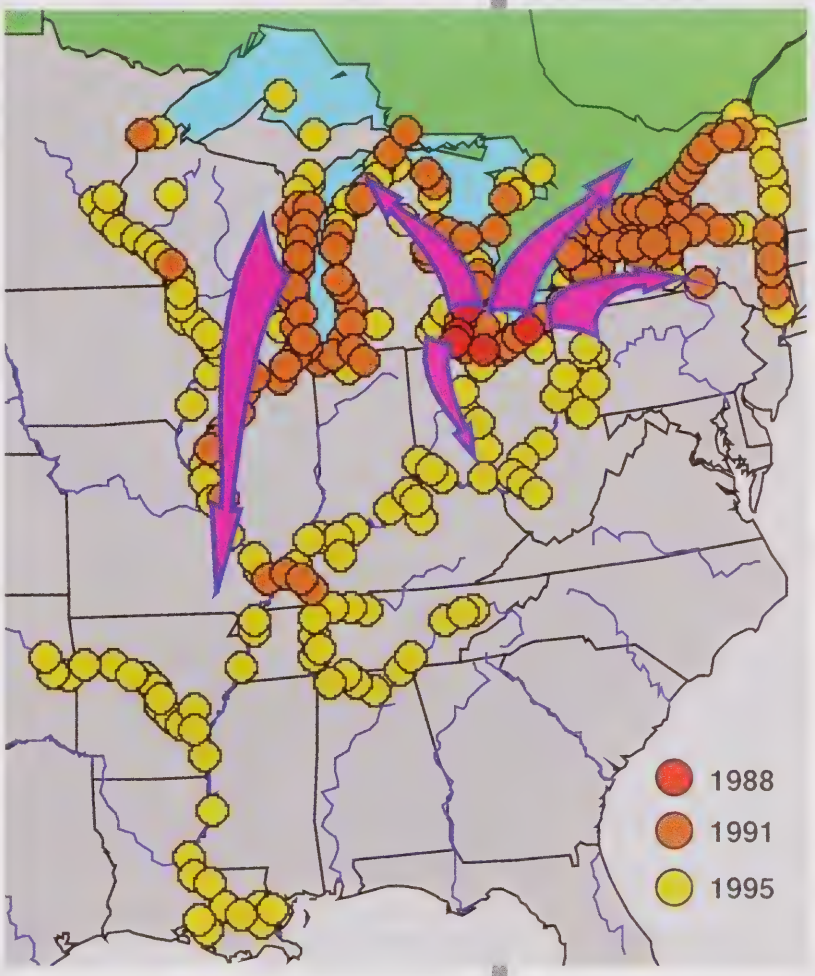
By 1994 zebra mussels were common in the Rideau Canal system and widespread throughout the Trent-Severn Waterway. In the United States a year later, the species had penetrated most of the Ohio River drainage and had followed the Mississippi south all the way to the Gulf of Mexico. The canal systems of New York State were fully colonized.

Excitement about the zebra mussel has not died down entirely. A sixth annual international zebra mussel (and other aquatic nuisance species) conference was held in early March. Ontario's zebra mussel hotline, founded in 1992, is still going strong, although it has become the Invading Species Hotline (province-wide, toll free, 1-800-563-7711). Beth Mackay of the Ontario Federation of Anglers and Hunters says the hotline is a joint project of the OFAH, the Ontario Ministry of Natural Resources, and the Canadian Coastguard. Call the hotline to get up-to-date information

A zebra mussel.

PHOTOGRAPH BY B. MAY

more typical centrifugal pattern, radiating from the point of origin, typical of species such as the zebra mussel.



The arrows indicate the main directions of zebra mussel invasion and describe a centrifugal pattern, radiating from the point of origin, that is typical of many introduced species.

on zebra mussels. And if you're really keeping up with the times, the zebra mussel even has its own worldwide web page < http://www.nfrcg.gov/zebra.mussel/ >.

And there has just been another development. There is not just one encrusting molluscan invader, but two. A second introduced species, given the common name of quagga *(Dreissena bugensis)*, has been found in Lake Erie and downstream through Lake Ontario to the St. Lawrence River. The second species is named after the horse-like quagga, a close relative of the zebra. The original quagga is now extinct, but lived formerly in South Africa. If the first striped mussel to invade was called a zebra, then of course its close (and almost indistinguishable) relative had to be called a quagga.

While the quagga mussel follows an encrusting lifestyle similar in many ways to that of the zebra mussel, there are some important differences. It usually forms only a minor component of invading mussel communities; it seems less likely to attach to native pearly mussels than the zebra; and it seems to prefer colder waters. This means that the quagga, while clearly not any kind of threat at present, might be able to survive farther north in Ontario waters than its more prolific relative.

Relations between zebra mussels and native species are not all bad. While native fauna

A native of Lake Erie, this gastropod snail, *Pleurocera acuta*, is encrusted by zebra mussels.

With biodiversity resources now at the forefront of public interest, zebra mussel interactions with other species are potentially worrisome. How serious a threat have they proven to be? The truth is, no one knows for sure yet. But there are a few indications of how things might go. Take the native pearly mussels for instance.

Pearly mussels are the familiar, large, clam-like inhabitants of most of Ontario's freshwater lakes, ponds, and streams. They live partially buried in the substrate where they feed by filtering microscopic plants, animals, and bacteria (plankton), and non-living organic particles out of the water. Ontario once had a rich native fauna with some 41 species, most occurring in the south. A number of the pearly mussel species are endangered, however, and some may have disappeared completely during the past 100 years, largely because of habitat modification through intensive agriculture.

Zebra mussels do not compete with pearly mussels for colony sites, because the native species burrow into all kinds of substrates whereas zebra mussels only attach themselves to hard surfaces. But where they occur together, some early fears have been confirmed. Zebra mussels can have a devastating effect on pearly mussel colonies. The invader can cause reductions in health, in numbers, and in several recorded cases complete extirpation of colonies of the native species.

How does this happen? Zebra mussels are also filter-feeders, and although small they can process gigantic quantities of water, passing the whole volume of a small lake

PHOTOGRAPH BY J. E. MARSDEN

through their bodies in a period of three or four days. Worse still, the zebra mussels attach themselves to pearly mussel shells, especially around the area where their life-giving stream of water is passed through to their bodies. It's been shown that although clusters of zebra mussels on the pearly mussel shell do not cut off oxygen to their host, they do restrict its mobility and cause it to die eventually. It appears that death results from the zebra mussels' filtering most of the available food out of the water before it can be used by the pearly mussel.

Yet relations with native species are not all bad. Zebra mussels have become so abundant in certain environments that they have become an important source of food for some native wildlife. They are fed on heavily by fish such as the freshwater drum. Ducks, especially the lesser scaup, and other aquatic birds also feed on zebra mussels. One estimate suggests that 5000 lesser scaup might consume more than 600 metric tonnes of zebra mussels during a year.

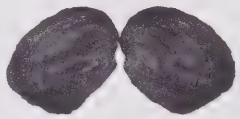
Zebra mussel colonies can create a structurally richer underwater environment than existed previously, providing a hospitable shelter for other freshwater invertebrates such as snails, insect larvae, small crustaceans, and aquatic mites. Two kinds of lower invertebrates, which are not richly represented in Ontario waters, both benefit from the zebra mussel invaders. The hydra, a tiny freshwater creature related to sea anemones and corals, feeds voraciously on the mussel's microscopic veliger larvae. And a simple, colonial freshwater bryozoan (or moss animal) uses the solid colonies of zebra mussels as a firm substrate upon which to anchor its own colonies, smothering the mussels in the process.

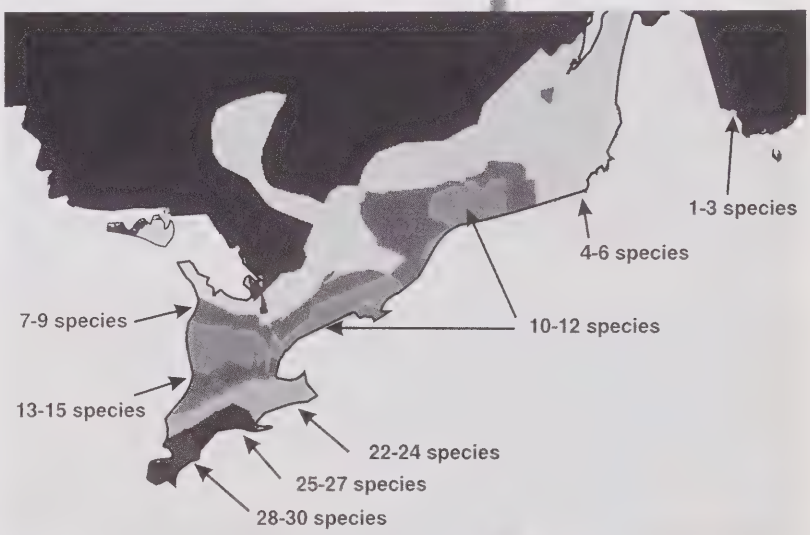
In the western end of Lake Erie, it has been shown that zebra mussels do not have any negative effect on the spawning or growth of a variety of different fish species. And they may actually stimulate the growth rate of yellow perch by creating a more favourable habitat for the crustacean prey on which young fish feed, thereby creating an abundance of this food source.

Even in stony environments where crayfishes frequently live, zebra mussels may not have a particularly negative impact on the native benthic community. Crayfishes suffer from the effects of zebra mussels attaching themselves to their exoskeletons. Unlike pearly mussels, however, crayfishes are able to divest themselves periodically of the mussel load when they moult their exoskeletons, an integral part of their growth process. Crayfishes are omnivores (feeding not only on plants, animals, and carrion, but even on plankton and possibly nutrient-rich bottom mud). They feed readily upon zebra mussels and seem to prefer them to plant material.

Probably the one thing that everyone seems less worried about these days is the cost of keeping water-handling facilities free of fouling layers of encrusted mussels. Municipal wa-

A pearly mussel.



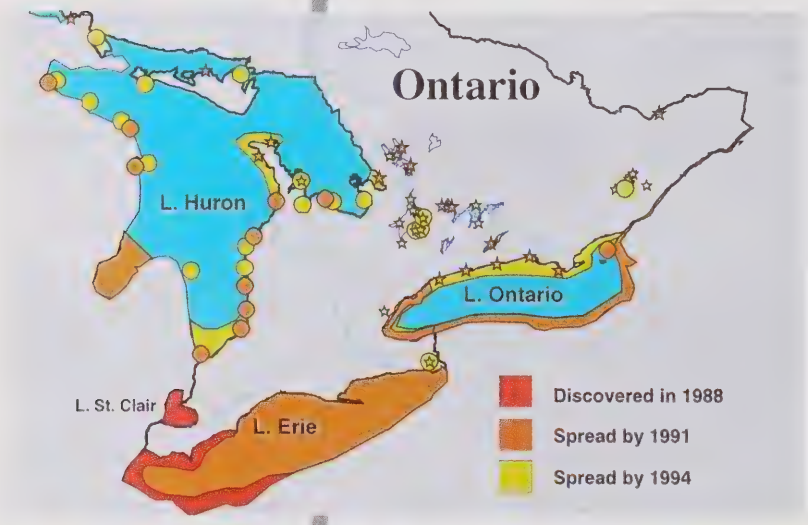


This map shows the rich biodiversity of Ontario's freshwater pearly mussels. The extraordinary variety of species is centred in extreme southwestern Ontario, the region of most dense zebra mussel populations. Because zebra mussels can kill pearly mussels, a zebra mussel invasion of Ontario's smaller lakes and streams could devastate such native fauna.

populations, such as the pearly mussel, are threatened when located in regions densely populated by zebra mussels others, such as yellow perch, benefit from the mussels' proximity.

PHOTOGRAPH BY BRIAN BOYLE

Invading species cause change—good and bad.



Zebra mussels have colonized most shallow water regions of the lower Great Lakes along main shipping routes, major canal systems, and inland waterways. Isolated waters are relatively untouched so far.

At this time the range of the closely related quagga mussel is restricted in Ontario to the deeper waters of Lakes Erie and Ontario.

Change happens continually in the natural environment.

ter purification facilities and power plants around the Great Lakes seem to have learned how to cope with the new organism in their water supply—but not without some tense moments, including partial shutdowns and elaborate scrubbing operations during the first couple of years of the invasion.

Research continues in order to find the most effective control measures, and in Canada most of it is carried out by Ontario Hydro. The list of potential treatment methods includes sterilizing the intake water with chlorine, the use of anti-fouling paints (teflon, copper), ultraviolet irradiation, electrostatic fields, thermal shock, a host of new chemicals, and filtering the intake water efficiently. Most of these approaches are effective to one degree or another, but add either to potential environmental concerns or to the operating costs of water purification and power plants.

There have been increases in costs, although only marginal. Paul Wiancko of Ontario Hydro estimates that perhaps $20 million has been spent putting zebra mussel control systems into place, with an ongoing operating cost for the whole provincial system of up to $1 million annually. But because of the multimillion-dollar annual cost of operating even a single nuclear generating station, the incremental costs of control have proven to be relatively small, certainly less than one per cent. Wiancko says that zebra mussel control has so far not resulted in any increase of electricity rates to the public.

Hydro is getting good control results so far from chlorination of intake water. But there is still a potential environmental concern in the use of any chemical method. If new evidence of environmental damage should surface, Hydro has alternative systems such as very small-pore strainers in the operating pilot stage. These filter systems could be installed more widely, but only at a further capital cost to the utility.

And what of the ecosystem itself? How has it fared since zebra mussels became established? What can be expected in the future? Some preliminary indications of the answers to these questions arise from three years of work on Saginaw Bay in Michigan, right across Lake Huron from such Ontario port cities as Goderich and Port Elgin.

In Saginaw Bay the invasion of zebra mussels changed the ecosystem from a fairly simple one where most biological activity took place in open water to a more complex one where the biological activity on the bottom has led to a greater diversity of species. Much of this effect is achieved by the mussels' prodigious capacity for straining microscopic plants and animals out of the water and depositing the nu-

trients they contain on the bottom. The resulting increase in water clarity permits deeper penetration of sunlight, which allows more aquatic plants to grow on the bottom. The aquatic plants, in turn, provide homes and food for a greater diversity of bottom-dwelling invertebrate animals. The new system is neither clearly better nor worse than the old one, just different.

So the scourge of the Great Lakes has been downgraded to an aquatic nuisance species. Good news, in a way, because it's a much more realistic assessment of the threat. Zebra mussels represent change, and change is happening continually in the natural environment. Ontario has been undergoing especially rapid environmental change during the 10 millennia since the most recent retreat of the continental glaciers. Almost all of the species native to the province have arrived from locales farther south during the past 10,000 years.

Change is a given. It can't be stopped even though at times it may seem unpleasant and unwelcome. The stability of natural systems is an illusion created by the perspective of our painfully short human life span. The true question we have to ask ourselves is what type of change and how much change is acceptable.

The resources to control all potential environmental changes do not exist, so it is important to assess, monitor, prioritize, and make decisions about where best to apply our efforts. Biodiversity resources, for instance, are such an important source of future prosperity that it behooves us to monitor closely any and all changes taking place to determine when and where to try to affect the outcome. This is especially true of the changes, like zebra mussel invasion, that people initiate. Humans have, after all, become one of the most potent agents of environmental change since the last big meteor struck.

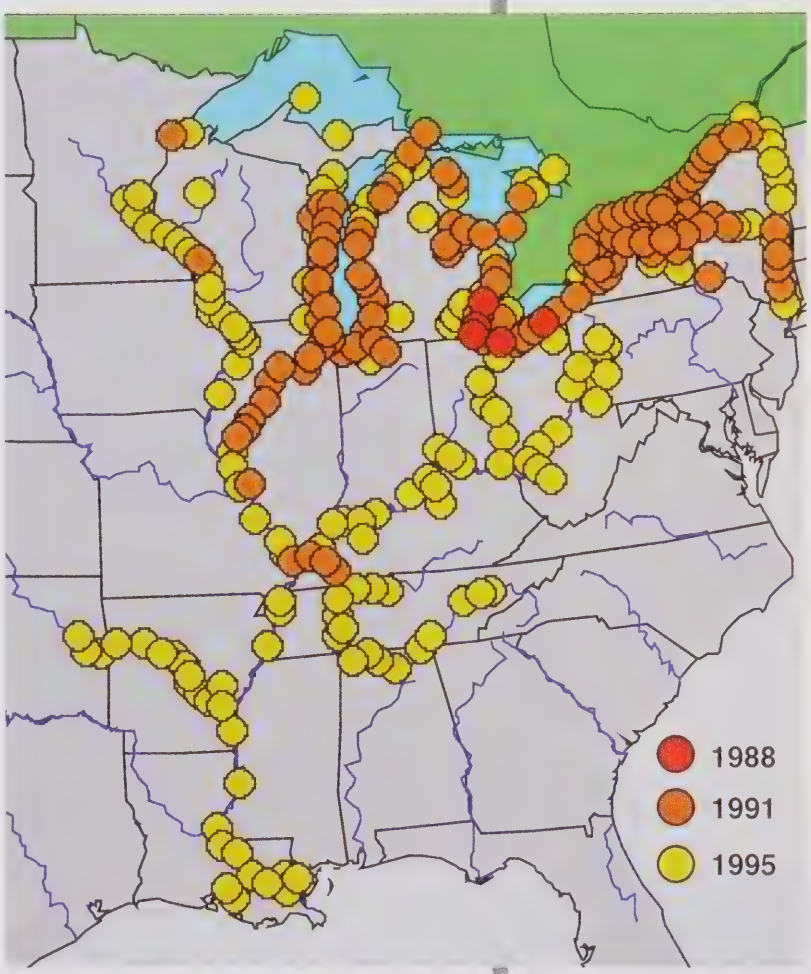
A case in point is that zebra mussels have so far made few inroads into Ontario's smaller rivers, the places where large boats never go. These same streams still contain a substantial reservoir of the biodiversity of Ontario pearly mussels. Everyone who uses very small pleasure craft, such as motor boats and canoes, should be concerned. It's important not to transport zebra mussels on the bottom of small vessels into habitats which so far have been isolated. You can find out more about washing small boats from the invading species hotline, and you may be amused to learn that laboratory tests show diaper cream is an effective agent for keeping zebra mussels from attaching themselves to boats.

People have to learn to adapt to continual change. Other organisms in the environment have been doing it for thousands of years, resulting in the native fauna and flora we enjoy today. Change can't be such a bad thing after all. ❦

A quagga mussel.

PHOTOGRAPH BY J. E. MARSDEN, LAKE MICHIGAN BIOLOGICAL STATION

Furthermore almost all of the animal species native to Ontario



The history of the spread of zebra mussels in North America is shown on this map. There appear to be strong factors preventing northward migration.

have arrived from locales farther south during the past 10,000 years.

The Cultural Legacy of Herman Levy

A need to share his lifelong passion for art led Herman Levy to make an outstanding bequest to the ROM

Lee-Anne Jack

PHOTOGRAPH © YOUSEF KARSH

When a young Herman Herzog Levy went to Amsterdam in 1923 to apprentice as a jeweller, his mother urged him to visit the Rijksmuseum to see the Rembrandts she dearly loved. Dutifully, Levy went to the museum, sat down, looked around him, and was thoroughly unimpressed. He decided there was either something wrong with his mother and the rest of the world or something wrong with him. So for a period of three weeks, he went back to the museum every day and sat and stared at the Rembrandts until at closing time the somewhat suspicious museum guards would ask him to leave. At the end of three weeks he had come to the conclusion that his mother was right. His enduring passion for learning and the arts was kindled.

A man of strong resolve and unstinting public spirit, Dr. Levy continued throughout his life to pursue his interest in and support of the arts as carefully and tenaciously as he had set about studying the Rembrandts. At the core of this intense focus was his belief that each person is responsible for adding to civilization. Since he was not personally able to create works of art, Dr. Levy strove to preserve the works of others. He encouraged many young artists, served on boards of cultural institutions, and collected artwork, donating paintings and ceramics from his collections to several museums and galleries in Ontario. Upon his death, he bequeathed an unprecedented $28 million to be shared between the Royal Ontario Museum and McMaster University for the acquisition of art.

Despite his public profile as a philanthropist, Herman Levy remained a somewhat enigmatic figure. Warm and funny with those he knew, he could seem intimidating to others. "Herman had a reputation sometimes for being a little bit irascible," explains Karen Mills, an art administrator to whom Dr. Levy was a mentor and close friend. He was intensely private, hated flattery, and didn't suffer fools gladly. He was also very vocal in his opinions, which he didn't temper to suit his audience—a trait he'd possessed since childhood. Upon returning from his first lesson at religious school when he was 11 or 12 years old, his father asked him whether he got anything out of it. "Yes sir," Herman said. "Well what?" asked his father. "A headache," the young Levy replied. Honourable and honest in all his dealings, Levy put his blunt outspokenness and astute critical judgement to work for causes he believed in. As a member of the Board of Management and then the Board of Governors of the Art Gallery of Hamilton for more than three decades and a mem-

Lee-Anne Jack is a writer and editor in the Publications Department, Royal Ontario Museum

COVERED JAR
Song dynasty
late 12th –13th century AD
983.231.23
Gift of Dr. Herman Levy

DISH
Song dynasty
late 11th –12th century AD
983.231.71
Gift of Dr. Herman Levy

This collection of items donated by Dr. Levy to the Royal Ontario Museum is representative of his quietly elegant taste. The dish is of Jun ware, which flowed from kiln centres across north China from the Song to the Yuan dynasty. Treasured for its lovely opalescent glazes and simple satisfying shapes, Jun ware was a favourite of Dr. Levy's. The covered jar with its celadon glaze—also greatly admired by Dr. Levy—was of a type placed in Song dynasty tombs in Southern China, often in pairs, for the purpose of containing sustenance for the deceased. The rat is the first of the 12 animals of the Chinese "zodiac," and this one, carved from grey-green jade, is the most unusual piece in Levy's small jade collection.

RAT
Qing dynasty
first half of the 19th century AD
983.231.102
Gift of Dr. Herman Levy

ber of the Board of the National Gallery of Canada, Levy wasn't afraid to voice unpopular opinions if he felt they were for the greater public good.

Born in Hamilton, Ontario, on 2 January 1902, one year before his sister Elsie, Herman was a member of a very cultured Jewish family who came from Germany bringing a liberal form of Judaism to the community. As a young man, Levy spent time canoeing and hiking in northern Ontario and honing his skills as an athlete, while his father and uncles were busy influencing the cultural, political, and commercial life of Hamilton—a path the young Levy would soon follow. After completing his jewellery apprenticeship in Amsterdam, Levy acquired a degree in political science and economics at the University of Toronto before joining the family's very successful firm, Levy Brothers, which imported diamonds and manufactured jewellery. Eventually he took over the reins, overseeing operations until 1960 when he liquidated the firm.

During that time, Levy frequently travelled in Europe admiring and collecting art. He wasn't content to visit the big commercial galleries of the day in quest of new paintings. His curiosity took him off the beaten path as he sought out the artists in the community by simply walking the streets and stopping to chat with people, asking if they'd seen anything good. Through such queries he found in Paris the Japanese artist Foujita, from whom he purchased sketches. He maintained this avid curiosity all his life, frequenting student exhibitions at McMaster University in his final years to see who was doing what.

In the early '70s, Levy's interest in 16th-, 17th-, and 18th-century silver first brought him to the Royal Ontario Museum, where the fine collection of Chinese ceramics caught his eye. Paintings had become too expensive for his budget and he soon became a fixture in the Museum's Far Eastern Library, poring over auction catalogues and absorbing as much knowledge as he could in order to build a ceramics collection of his own. With his exacting eye, trained in the grading of diamonds, he was able to look very precisely at works, seeking a particular purity of line or lustre in the glaze. "The whole system that Herman used for selecting artwork, for selecting ceramics," says Karen Mills, "and the way he dealt with everything was to learn as much as possible and very carefully evaluate things."

He read voraciously and the depth and breadth of his knowledge not only on art but on a wide variety of subjects from banking to genetics was formidable. He was notorious for turning up at lectures—the Bishop White series at the ROM in the early '70s, for example, or arts courses at McMaster University—and asking keen and often difficult questions to check that the lecturers had "done their homework." At the annual lunches he gave at his Undercliffe Avenue home for the ROM's Far Eastern Department and Bishop White Committee, this testing of knowledge was a prominent feature. "He would sit there and watch everyone's reactions with his very puckish smile and a glint in his eye," says Joan Fitzpatrick, a past chair of the ROM's Bishop White Committee.

After a gourmet lunch, Levy would linger only so long over coffee served in heirloom Crown Derby cups before getting down to work. "He liked to use his collection to teach," says Doris Dohrenwend, one of the two ROM curators named in Levy's will to make purchases with his endowment. "He gained knowledge all the time and liked to share it with others." He also took great joy from the little things, getting excited whenever a new piece arrived for his collection or when thimbleberries came into season, delighting in importing green tea from a very particular place in China, and puttering in his beloved rose garden where he eventually died. "He'd look at a rose in the same way he'd look at his paintings or ceramics," recalls Patty Proctor, who was also named in the will to make purchases for the ROM with Levy funds. "He had a great sensitivity to beauty." In 1985 when he was invited to accept the degree Doctor of Laws *honoris causa* at McMaster University to recognize his contributions to the cultural life of Hamilton, Levy said, "It is strange that I am being rewarded for doing what I like doing best—looking at beautiful things."

Although his home was hung with canvases by Van Gogh, Sickert, Monet, Pissarro, and Courbet and densely populated with Chinese celadon, Levy felt that the most valuable of possessions was time. He concentrated his energies on the things he felt were important and was impatient with pomp. In 1988, he visited the newly opened National Gallery in Ottawa and later complained, "You know they made us have lunch. I couldn't whip them out of there fast enough. We wasted 20 minutes eating when we could have been in those galleries looking at things."

Dr. Levy was a lifelong bachelor and with him the family line came to an end. "He didn't believe in life after death," says Karen Mills. "And I think that's part of the reason why he focused so intensely on his art collection, because that is something that endures."

Dr. Levy's legacy was the enrichment of Canada's cultural community through the donation of works he carefully amassed and through his bequests for further purchases. The ROM, through his generosity, was able to obtain some extraordinary pieces for its Far Eastern collection, adding not only to the collection's beauty, but filling gaps in its comprehensiveness and adding to its educational value. With his donations and bequests, Dr. Levy passed on his passions for art and education in the hope that others would learn about and appreciate the things he had always treasured. ❦

PHOTOGRAPHY BY BRIAN BOYLE

Highlights of the Dr. Herman Herzog Levy Bequest

Pendant in the form of a horned animal mask
Jade
W. 5.9 cm
China. Northeastern, Hongshan Culture
Neolithic Period, c. 4000 – 2000 BC
992.175.1
Dr. Herman Herzog Levy Bequest Fund

Recent discoveries in China's northeast, beyond the Great Wall, have revealed a society that used jade extensively for both decorative and ritual purposes. This was the Neolithic Hongshan Culture (c. 4000 to 2000 BC) of the Liao Valley and adjacent areas. Simplification in this mask of either ox or takin (the two best possibilities) has not reduced the power of the representation. A horizontal rough ledge has been isolated at the back of the mask to perforate for hanging.

Water and Wine Vessels

Bronze
Maximum dimensions: Fou 49 cm, hu 41.5 cm and shao 20 cm
China. Chu Kingdom
Eastern Zhou dynasty, c. 550 – 400 BC
992.60.1–3
Dr. Herman Herzog Levy Bequest Fund

While most of the ROM's Bronze Age collections are from North China, these monumental pots are southern. Called the "blue bronzes" for their ravishing surface mix of green (malachite) and blue (azurite) corrosion that results from burial, these vessels now represent at the ROM the rich southern Kingdom of Chu. As do comparable vessels from the 5th century BC tomb of the Marquis of Zeng, among others, the larger is believed to have held water and the smaller, wine, while ladles of this sort have been found inside water vessels.

TOMB GUARDIAN

Wood and antler (Cervus nippon), painted with lacquer
H. 96 cm
China. Chu Kingdom
Eastern Zhou dynasty, c. 500 – 300 BC
995.15.1–4
Dr. Herman Herzog Levy Bequest Fund

The ancient central Yangtze state of Chu is known for exquisite lacquers, silk embroideries, haunting poetry, and strange wooden images with antlers and long tongues which guarded Chu tombs of the 6th to 3rd centuries BC. Many of the latter have been excavated, but were lost through lack of conservation and became rare on the market until recently when a few have been released for sale. They represent a striking strain in China's pre-Buddhist religious iconography, and an ongoing motif in art if not belief.

CHAPE

Jade
H. 11.3 cm
China. Late Eastern Zhou-Han, 4th – 2nd century BC
993.31.1
Dr. Herman Herzog Levy Bequest Fund

When the royal tomb of the second King of Nanyue at Guangshou (formerly Canton)was excavated, the royal remains were flanked by 10 jade-ornamented iron swords, the longest of which was 146 cm. It was from the lacquered wood or leather scabbard end of such a ceremonial sword that this chape surely came. It belongs to the second great period of jade in Chinese history, the first being the Neolithic and the third, the long Qianlong reign of the Qing dynasty.

MEN PLAYING A GAME CALLED LIUBO
Lead-glazed earthenware
H. 16.4 cm
China. Eastern Han dynasty, 2nd century AD
992.78.1 – 4
Dr. Herman Herzog Levy Bequest Fund

> Then with bamboo game sticks and ivory-inlaid board the liubo game begins: Both sides advance at once; they press and contend. Reaching the target and recording a double score, one shouts, "Five White!" Dice of rhino horn, fashioned in Jin, flash in the sun.
>
> From *The Summons of the Soul*, c. 300–230 BC

Beyond what is told in the poem above, there is little known about this game or the markings "T" "L" and "V" that appeared on the game board. Representations of the game, popular during the Han dynasty, have been found in tombs, sometimes depicting immortals as the players.

DANCER
Lead-glazed earthenware
H. 35.2 cm
China. Tang dynasty, AD 727
991.133.1
Dr. Herman Herzog Levy Bequest Fund

> Her rouged cheeks glow redder as her sleeves
> dance more quickly;
> Her blackened brows grow sadder as her song
> sounds more slowly.
>
> Bai Juyi, poet, AD 772–846

Because dated epigraphs became common in the Tang dynasty, this lovely lady with her rare blue glaze can be accurately dated to AD 727 when a smaller figure, identically glazed, was unearthed from the tomb of An Yanshou. Her pose, characteristic of a dancer, echoes similar postures found in Chinese sculpture over at least seven centuries and is testimony to China's enduring traditions of dance and sculpture. Cobalt, the blue pigment in the glaze, became available from Iran with the opening of the trade routes through Asia. Though rare, the use of cobalt was typical in this period, later falling out of fashion for some 800 years.

FEMALE POLO PLAYER
Lead-glazed earthenware
W. 34.2 cm
China. Tang dynasty, AD 695 – 715
992.132.1
Dr. Herman Herzog Levy Bequest Fund

At the time this figure was made, women of the court enjoyed great freedom. They rode astride through the streets—faces exposed to prying eyes. They even played polo. Although she wears a man's coat, the figure's two-pronged chignon signifies her gender. Glazed polo players are rare; this one is particularly unusual because, contrary to artistic convention, the woman leans in one direction while the horse veers to the other. The pose is more realistic and lends balance to the piece.

RELIQUARY

Bronze and copper alloy, cast and hammered
H. 15.3 cm
Korea
Great Silla, late 9th – early 10th century AD
992.124.1
Dr. Herman Herzog Levy Bequest Fund

Such reliquaries—often nested in a series of containers within a stone casket—were placed under or in the Far Eastern pagoda, the central monument and heart of a Buddhist monastery. An innermost container of glass, jade, or rock crystal (quartz) would have held the relic or symbolic offering. Reliquaries were sometimes taken out from the pagodas and employed in rituals evoking the presence of the Buddha or a saint.

TEA BOWL
Black-glazed stoneware
Dia. 15 cm
China. Song dynasty, 12th – 13th century AD
994.11.1
Dr. Herman Herzog Levy Bequest Fund

As well as the soft greens of celadon glazes and the opalescent blues of Jun ware, Dr. Herman Levy loved the rich browns of the Song tea wares of both north and south China. Thus the purchase of this satiny black bowl gave Patty Proctor, curatorial assistant in the Department of Near Eastern and Asian Civilizations, the greatest pleasure. She knows he would have loved the purity of its conical form and marvelled at the delicately veined patterning, intentionally created through use of a real leaf. This style of tea bowl was unique to the kilns of Jizhou in Jkaryxi Province in Southern China.

DISH

Porcelain decorated in underglaze blue
Dia. 47 cm
China. Yuan dynasty, mid – 14th century AD
994.38.1
Dr. Herman Herzog Levy Bequest Fund

By the Yuan Dynasty, well-tried production methods provided a bountiful supply of Chinese ceramics for avid overseas customers. The large size of this dish suggests that it was made for export to the West Asian market. Cobalt, used to obtain the colour blue, had been employed as a pigment centuries earlier in China, but it was not until the latter years of the Yuan dynasty that it began its rise to a preeminence that was to last for centuries, influencing European stoneware and porcelain. The inspiration for this innovation likely came from Iran where cobalt was being used to decorate earthenware. It was only in China, however, that potters could fire porcelain.

SEATED LUOHAN

Fine-grained hardwood, traces of gesso and polychromy
H. 1.02 m
China. Yuan-Ming dynasty, 14th century AD
995.161.1
Dr. Herman Herzog Levy Bequest Fund

> As a lamp stationed in a windless place
> Flickers not, this image is recorded
> Of the disciplined man controlled in thought . . .
> The *Bhagavadgita* on the ideal yogi

The sculpture is probably from a temple group of 16 monkish figures of holy men, who would have been ranged along the side walls of a Buddhist monastery hall. Called *arhats* or "worthies" in India, *luohan* in China, they were roughly comparable to the disciples and saints of Christianity. Like the disciples, they multiplied through time and space and were sometimes difficult to identify. The *luohan* strove to meditate in lonely places; banish from their minds "the five obstacles" of attachment, ill will, apathy, distraction, and doubt; purify themselves through intense concentration; and achieve the final stage of communicating knowledge.

Dish

Porcelain decorated in underglaze blue and overglaze yellow
Dia. 16.1 cm
China. Ming dynasty, mark and period of Hongzhi
AD 1488 – 1505
991.81.1
Dr. Herman Herzog Levy Bequest Fund

Plants redolent with auspicious meaning ring the gardenia at the centre of this dish. The seeds of the grapes below and the bursting pomegranates above symbolize fecundity. Paired persimmons bring promise of wishes fulfilled, and the lotus seed pod—present when the flower opens—portends the early arrival of children.

Dish

Porcelain decorated in underglaze blue and overglaze enamels in doucai technique
Dia. 20.8 cm
China. Qing dynasty, mark and period of Yongzheng
AD 1723 – 1735
993.98.1
Dr. Herman Herzog Levy Bequest Fund

Through clever punning, the red nandina berries, delicate narcissus, and the fungus of immortality growing at the base of one of the contorted "longevity rocks" express birthday wishes. The blue, which gives contour to the rocks, and outlines and details the plants, was painted on the porcelain body before glazing. After firing, the jewel-like enamel colours were meticulously painted in and the dish fired again at a lower temperature.

THE BEA

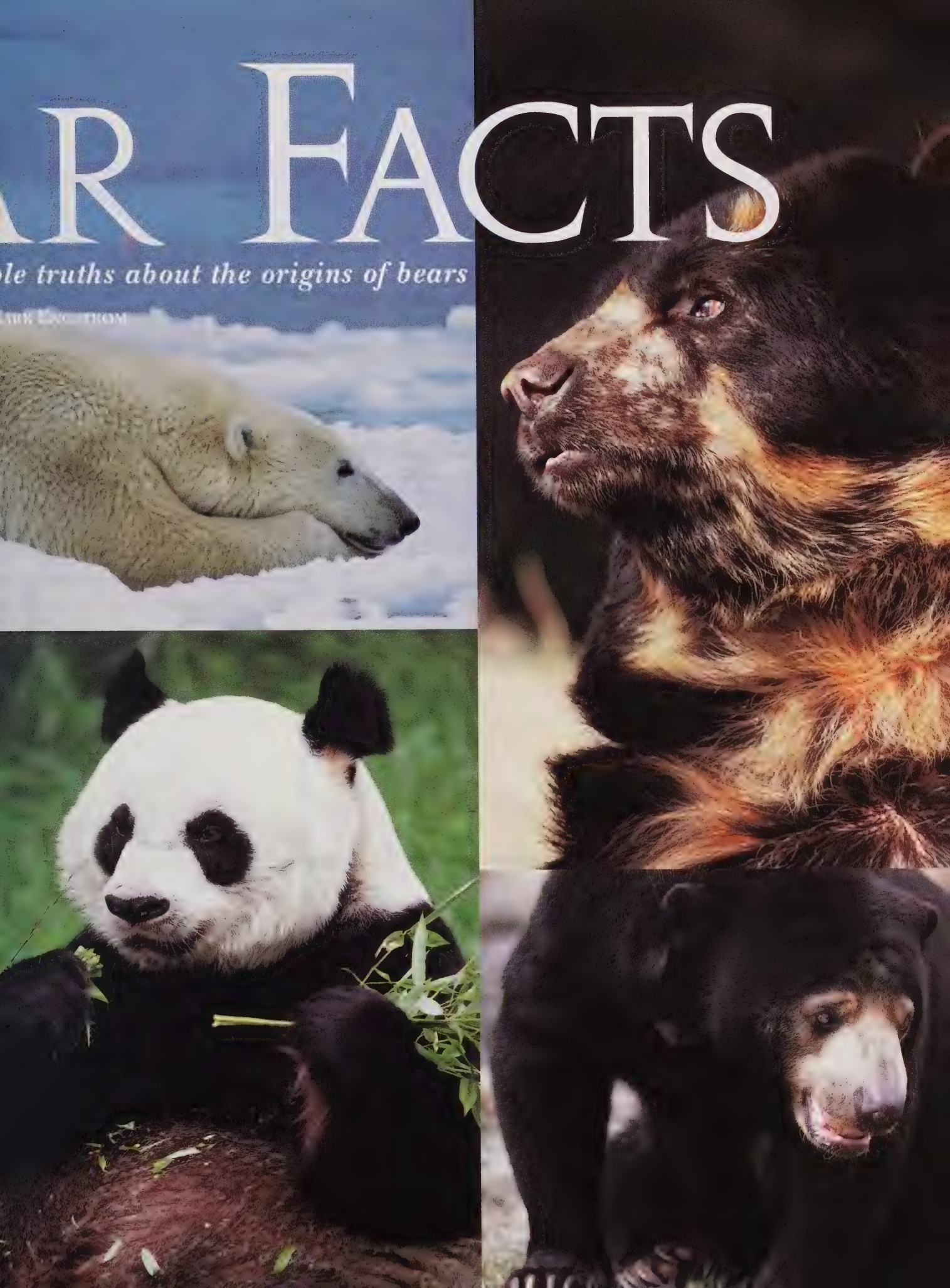
Scientists have discovered a few sir

JUDITH EGER AN

Bears, bears, everywhere, clockwise from centre: polar bear, spectacled bear, sun bear, giant panda, Asiatic black bear, Eurasian brown bear, sloth bear, North American black bear, grizzly bear. *Photographs by Stephen J. Krasemann, Aubrey Lang, Robert C. Simpson, John Cancalosi, Dr. A. Farquhar, John Cancalosi, Kennon Cooke, Wayne Lankinen, Stephen J. Krasemann/*VALAN PHOTOS

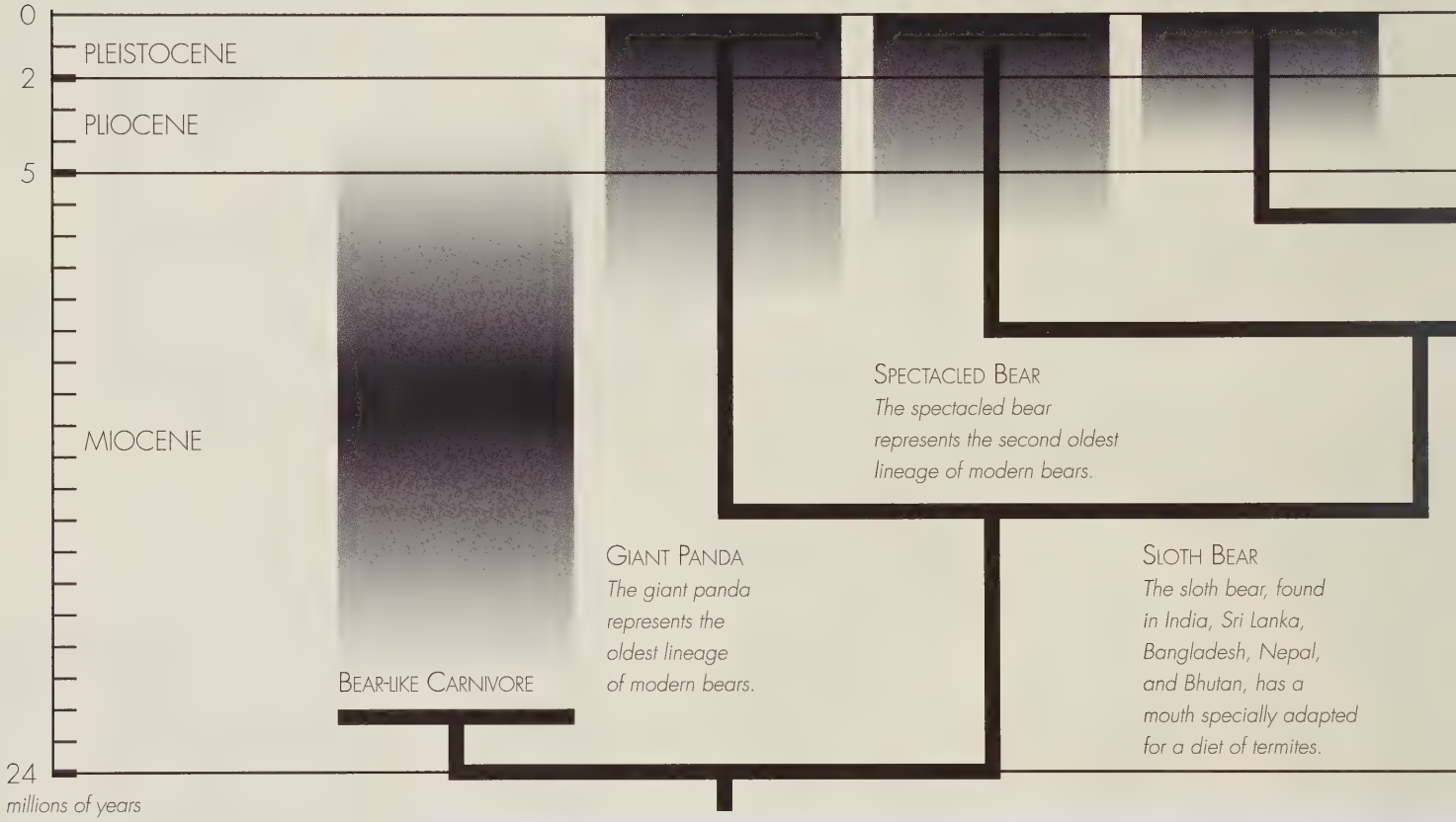
ALTHOUGH THE MODERN BEAR FAMILY IS SMALL—IT IS NOW considered to consist of only eight species—drawing the bear family tree has been anything but a straightforward task for scientists. Found on four continents—Asia, Europe, North and South America—bears share a number of general characteristics. With the exception of the polar bear, they are primarily vegetarian although they do eat meat when it is available. Each of their feet has five toes with well developed claws and, like humans, they walk on the soles of their feet, a posture referred to as plantigrade. Yet since the giant panda was first described in

Judith Eger and Mark Engstrom are associate curators in the Centre for Biodiversity and Conservation Biology


R FACTS
le truths about the origins of bears

Family	Ursidae			
Subfamily		**Ailuropidinae**	**Tremarctinae**	**Ursinae**
Genus	Ursavus	Ailuropoda	Tremarctos	Melursus
Species		melanoleucus	ornatus	ursinus

The boldly drawn tree (below) indicates the relationship of bear species to each other. The gradated bars indicate timing of the emergence and disappearance of the bear-like carnivore and the emergence of living bear species.


0
2
5
PLEISTOCENE
PLIOCENE
MIOCENE
24
millions of years
BEAR-LIKE CARNIVORE
GIANT PANDA
The giant panda represents the oldest lineage of modern bears.
SPECTACLED BEAR
The spectacled bear represents the second oldest lineage of modern bears.
SLOTH BEAR
The sloth bear, found in India, Sri Lanka, Bangladesh, Nepal, and Bhutan, has a mouth specially adapted for a diet of termites.

URSIDAE, THE FAMILY OF BEARS

1869 by Père David, a missionary and naturalist working in China, scientists differed over which species belong to Ursidae, the bear family, and where they fit on the tree.

Père David considered the giant panda to be a bear, calling it *Ursus melanoleucus*, meaning black-and-white bear. However, when the skeleton and skin of this animal were examined at the Museum of Natural History in Paris, M. Alphonse Milne-Edwards, the director of the museum, decided that certain features, such as the skull, resembled more closely those of the red panda (also called lesser panda, *Ailurus fulgens*), which had been described in the early 1800s. (Panda is a Nepalese word adapted by the French.) He also noted that both the giant and red pandas eat bamboo. Because the red panda also resembled the raccoon, Milne-Edwards placed both pandas in the raccoon family, Procyonidae.

Giant pandas, it was thought, also differed from true bears in other

Sun Bear
Found in southeast Asia, the sun bear is the smallest living bear and an excellent climber.

Asiatic Black Bear
This bear is distinguished from its closest living relative, the North American black bear, by its rounded, widely spaced ears and a prominent white flash on its chest.

North American Black Bear
The most numerous of all bears, the North American black bear, which may also be brown, cinnamon, honey, blue, or white in colour, is widely distributed throughout the forested areas of North America.

Brown Bear
Also known as the grizzly in North America, the brown bear is the world's most widely distributed bear and is found in Europe, northern Asia, Japan, western and northern Canada, and the northwestern United States.

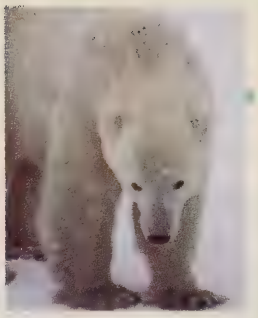
Polar Bear
The largest and only truly carnivorous living bear, the polar bear represents the most recent event in bear evolution having differentiated from the brown bear 100,000 to 200,000 years ago.

ways. They do not hibernate and they bleat rather than roar. Some scientists suggested that the pandas be placed in a separate family by themselves, the Ailuridae.

Studying the comparative anatomy of the two pandas and true bears in the 1960s, D. Dwight Davis concluded that the similarities of the giant panda to the lesser panda are the result of convergent evolution and that the giant panda is a highly specialized bear. Although his evidence was compelling, the debate continued until 1985 when Stephen O'Brien and a team of scientists from the National Cancer Institute in Maryland provided evidence from genetic research which strongly suggested that the giant panda is a bear. (The red panda is neither a bear nor a raccoon.)

A recent molecular study on all modern bear species by Dr. O'Brien and his colleagues Lisette Waits and R. H. Ward confirmed that the giant panda is a modern representative of one of the oldest

Polar Bear



Giant Panda

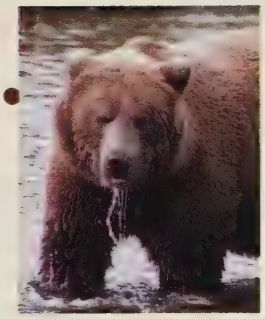
Sun Bear

Spectacled Bear

Where There are Bears

lineages of the bear family (subfamily *Ailuropidinae*). Sequencing six genes, the scientists were able to produce an evolutionary history or phylogeny for the bear family. All bears are descendants of a line of bear-like carnivores, which appeared in the Miocene epoch approximately 20 to 24 million years ago. They determined that the giant panda represents the oldest lineage of modern bears and that it diverged some nine million years ago. Although they were once more widespread, today pandas are found only in southwestern China, along the eastern edge of the Tibetan Plateau, restricted to six small areas in Sichuan, Gansu, and Shaanxi provinces.

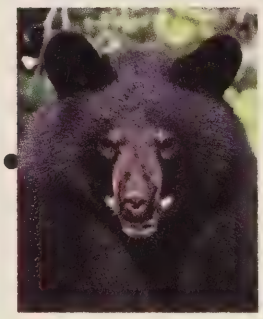
The next branch on the family tree, which occurred at about six to seven million years ago, led to the lineage represented today by the spectacled bear of South America (subfamily *Tremarctinae*). Named for the distinctive circular, creamy white markings around the eyes, this bear is found mainly in or near forested mountains of the north-



BROWN BEAR

ASIATIC BLACK BEAR

SLOTH BEAR



NORTH AMERICAN BLACK BEAR

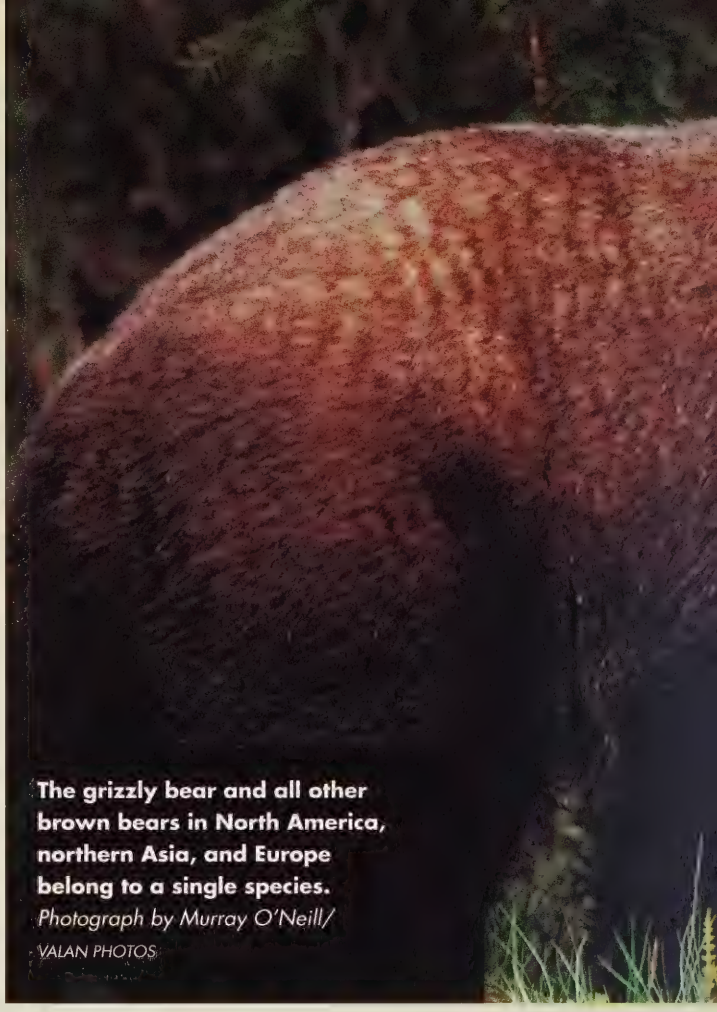
ern Andes from western Venezuela and Colombia, south through Ecuador, Peru, and into Bolivia.

While the giant panda and spectacled bear are the sole representatives of the two oldest lineages of living bears, six other species—sloth bear, sun bear, North American black bear, Asiatic black bear, brown bear, and polar bear—comprise a relatively closely related group, collectively referred to as ursine bears (subfamily *Ursinae*). This group appears to have originated with a burst, in the early- to mid-Pliocene epoch (some four to five million years ago).

The sloth bear is found in India, Sri Lanka, Bangladesh, Nepal, and Bhutan, feeds extensively on termites, and has special adaptations for doing this. The naked lips are capable of protruding and one pair of inner upper incisors is missing, forming a gap through which termites can be sucked.

The smallest of the bears, the sun bear is an excellent climber and

How Many Species of Brown Bears Are There?



The grizzly bear and all other brown bears in North America, northern Asia, and Europe belong to a single species.
Photograph by Murray O'Neill/ VALAN PHOTOS

What is the difference between a brown bear and a grizzly? Is the Kodiak the largest species of bear (and as such the most sought-after prize for trophy hunters)? These are two common questions about North American brown bears. In fact, scientific research now shows that North American and other living, large brown bears, including those in northern Asia and Europe, all belong to a single species, *Ursus arctos.*

Why has there been so much confusion over the classification of the brown bear? The answer lies partly in the great variability of this species in size and colour, but it can also be traced to differences in philosophy among the early taxonomists who studied these large carnivores.

In the early part of this century, relatively few specimens of brown bears were available for study. It is, after all, much easier to amass and store a collection of mice than bears. Those bear specimens that were available varied greatly in such physical characteristics as age, gender, and nutritional health and they came from a great range of widely scattered geographic locations. The sheer size of the animals also complicated classification. For example, a seemingly trivial difference among specimens of mice might appear highly significant when magnified to the scale of bears. The dilemma faced by taxonomists was whether some or all of the local populations from which the specimens were taken represented different species or just local variants of one or a few widespread, variable species.

This issue was first addressed in the early 1900s, at about the same time that a philosophical change was taking place in the traditional definition of a species. Prior to this time, species had been regarded as nearly fixed entities, with only limited variation possible around a basic morphological type. In other words, species were thought of as different immutable "kinds" of animals or plants. What now might be recognized as a widespread single species with different geographic races was then regarded as a series of distinct species. In the case of brown bears, by the turn of the century an astonishing 232 names had been applied to supposed species or subspecies (geographic races) across North America, Europe, and Asia.

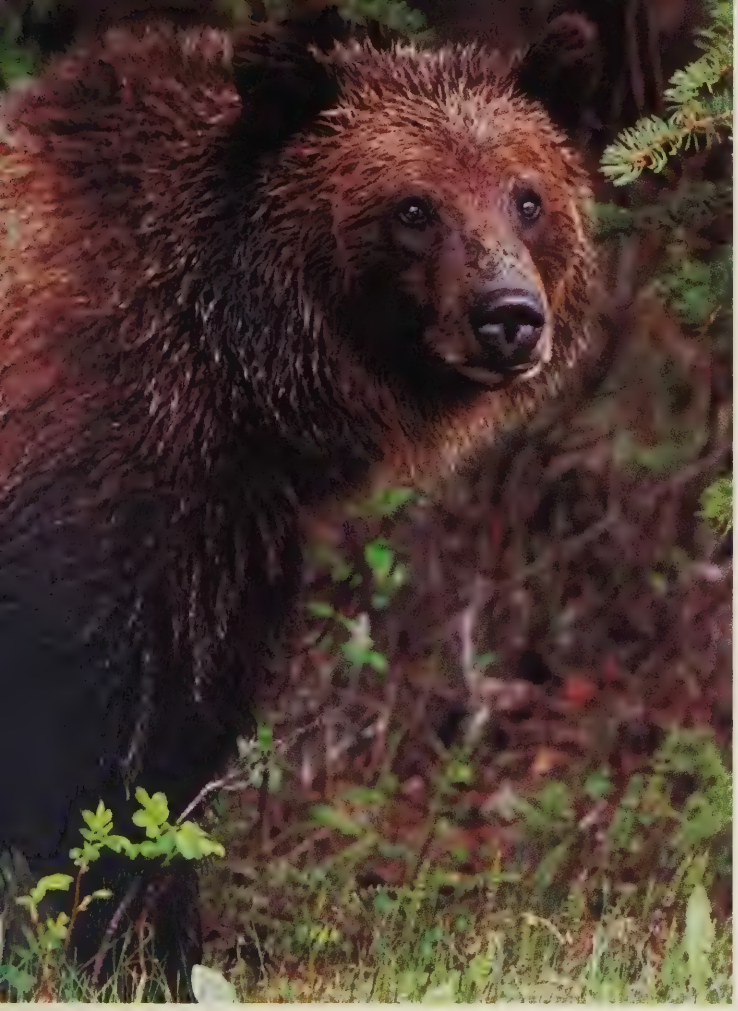
Traditional classifications of many mammals were challenged when the availability of more specimens from more geographic areas made it apparent that many previously recognized species graded one into the other. Species with large geographic distributions were often

is thought to sleep in trees. The sun bear is known throughout Southeast Asia from northern Burma and Bangladesh, Laos, Cambodia, Vietnam, Thailand, the Malay peninsula, Sumatra, and Borneo.

The Asiatic black bear is found over a large range of southern Asia from Afghanistan east through the Himalayas, as far south as Laos and Bangladesh, north through the Tibetan Plateau, Manchuria, forested areas of China, Taiwan, and Japan. It is distinguished from its closest living relative, the North American black bear, by its rounded, widely spaced ears and a prominent white flash on its chest.

The North American black bear, the most numerous of all the bears, is widely distributed throughout the forested areas of North America. Although most are black, some are brown, cinnamon, honey, blue (glacier), or white (kermode).

With the widest distribution of any species of bear, the brown bear (also called grizzly bear in North America) is found in Europe, north-



highly variable across their geographic range because of differences in climate, habitat, diet, and minor genetic differentiation. The traditional approach gradually gave way to the view that species were groups of variable populations united by reproductive ties. In other words, species are pools of local populations capable of regular interbreeding, despite any local morphological differences. Dogs provide an extreme example to illustrate this point. All breeds are fully interfertile and are members of a single species.

Dr. C. Hart Merriam, first president of the American Society of Mammalogists and founder of the United States Biological Survey, was a holdout against the new view. Dr. Merriam remarked in the first issue of the *Journal of Mammalogy* (1919: p. 7): "To my mind, the *criterion of intergradation* [using perceived interbreeding to determine species boundaries] is one of the most pernicious that has ever been introduced to the systematic study of animals." By coincidence, Dr. Merriam was studying brown bears at the time, and the previous year he used this group to emphasize his view of species. In his revision of *Grizzly and Brown Bears of North America* published in 1918, he recognized 78 distinct species in North America alone, including the brown, grizzly, and Kodiak. This number has been widely regarded as highly inflated ever since, but his conclusions were not formally readdressed until nearly 70 years later. No wonder the general public has been confused about the identification of brown bears.

Since Merriam's review, genetic evidence and reassessment of museum specimens have combined to demonstrate that only one, highly variable, species of large brown bear actually has existed in North America and that this is the same species found in northern Asia and Europe. Applying the biological, reproductive concept, Dr. E. Raymond Hall of the University of Kansas finally assigned all 78 of Merriam's species to the single, geographically variable species *Ursus arctos* in 1984.

The problem of classifying the brown bear is an interesting example of how scientists' philosophies and preconceptions act to mould people's perceptions of the natural world. It also points out why large numbers of specimens from different geographic areas are usually needed to characterize species and why large research collections are maintained by museums.

As a final note, the reproductive concept of species has recently been challenged from several quarters, although these disputes are unlikely to alter significantly the current view of the taxonomy of brown bears as representing one wide-ranging, albeit highly variable species. One need not travel to Kodiak Island to see the second-largest living species of carnivore on Earth.

ern Asia, Japan, Alaska, and western and northern Canada (the barren ground grizzly). There are also localized populations in the northwestern United States.

The most recent event of bear evolution was the differentiation of the polar bear from the brown bear, which took place some time in the mid-Pleistocene epoch, 100,000 to 200,000 years ago (see sidebar). Found throughout the polar regions of the world, the polar bear is the largest of the modern bears and is the only bear that is truly carnivorous.

Ursine bears originated in Europe. Immigration to North America was achieved via the Bering land bridge as early as four million years ago. Fossil finds of North American black bears have been retrieved over most of the continent, indicating their presence for the last two million years. During the Pleistocene, the black bear increased in size and black bears of Wisconsin age (the last 80,000 years) were the size of present-day grizzlies. During the warm interglacial period of the past

The Recent Mariner

The polar bear, or *nanuk* as it is known to the Inuit, is unusual among land carnivores in that it relies on the sea for sustenance and has become partly aquatic. It is not unique in this regard; seals, sea lions, and walruses also evolved in the more distant past from a terrestrial carnivorous ancestor, interestingly one that was probably closely related to the bear family. Among bears, the polar bear is also unusual in that it is carnivorous, whereas other bears are omnivorous, eating a variety of plant and animal matter.

The polar bear is not commonly known from the fossil record, but the remains that have been found, along with corroborating evidence on genetic divergence, point to a relatively recent origin compared to many living mammals, some time in the past 100,000 to 200,000 years.

Polar bears are closely related to and probably evolved from brown bears. In fact, the two species can successfully interbreed in zoo settings, although no natural hybrids have ever been found in the wild. Polar bears evolved during the Middle Pleistocene epoch, at a time when the Arctic was drastically altered by the repeated ebb and flow of massive sheets of glacial ice.

Proving that one bear's famine is another's feast, the polar bear has adapted to bleak arctic winters that reduce the availability of most animal and plant foods, but make sea ice available as a highway to their prey: aquatic, air-breathing seals. Polar bears are probably the descendants of a population of brown bears that took to hunting prey by travelling out on sea ice for extended periods. Modern brown bears that live along the Canadian arctic coast have been observed feeding on seal carcasses found many kilometres out on sea ice. Furthermore, brown bears are opportunists who focus on prey and other foods when it is particularly abundant, such as the salmon run in Alaska during the fall, caribou calves in the spring, ground squirrels in the summer, and seasonal berries. It is easy to envision a population that began to concentrate its diet on seals, which were a bounteous, rich, and probably unwary food source, perhaps first dis-

Polar bears engage in a mock battle. The polar bear is the most recently evolved member of the bear family.
Photograph by Fred Bruemmer/ VALAN PHOTOS

10,000 years, there has been a marked decrease in the size of this species, a phenomenon also seen in many other species of large mammals.

Ursus arctos, the brown or grizzly bear, is a relative newcomer to North America, having arrived by the early Wisconsin (80,000 years ago) or possibly even earlier, as seen by fossils found in Alaska. Near the end of this last glacial advance (approx. 15,000 years ago), the brown bear migrated south from Beringia into the unglaciated part of the continent, thereby greatly extending its range. However, that range had already been significantly reduced by the time Europeans arrived. The ROM has on display a fossil grizzly bear skull found near Lake Simcoe in Ontario. Results of radio-carbon dating indicated that the bear died some 11,700 years ago.

Historically, brown bears extended eastward across the great plains of Canada and the United States. However it appears that they were never abundant east of the Mississippi River. According to

covered by feeding on smelly, dead carcasses of adults and on easily captured pups.

Numerous physical changes have accompanied the polar bear's adaptation to its life of roaming the sea ice. Perhaps most obvious is its white coat, which serves as insulation and camouflage during hunting. Between moults, the coat becomes stained and worn and, depending on the angle of light, it will appear yellow. It has sometimes been said that polar bears cover their black noses while hunting to avoid being noticed by seals—a story that, while very entertaining, appears to have no basis in fact. Polar bears are also shaped differently from other bears. Their relatively long, slim necks and heads provide a more streamlined shape for swimming. The massive heads and short "teddy bear" faces of other bears are supported by massive facial and neck muscles used for crushing and grinding vegetation. Such muscles are smaller in the carnivorous polar bear, which consumes its food by tearing and shredding. The polar bear also has massive feet for a bear its size. These oversized feet act as large paddles for swimming and as snowshoes when moving across land or ice. Dimples and fleshy bumps on the soles of the feet provide better traction on slippery surfaces.

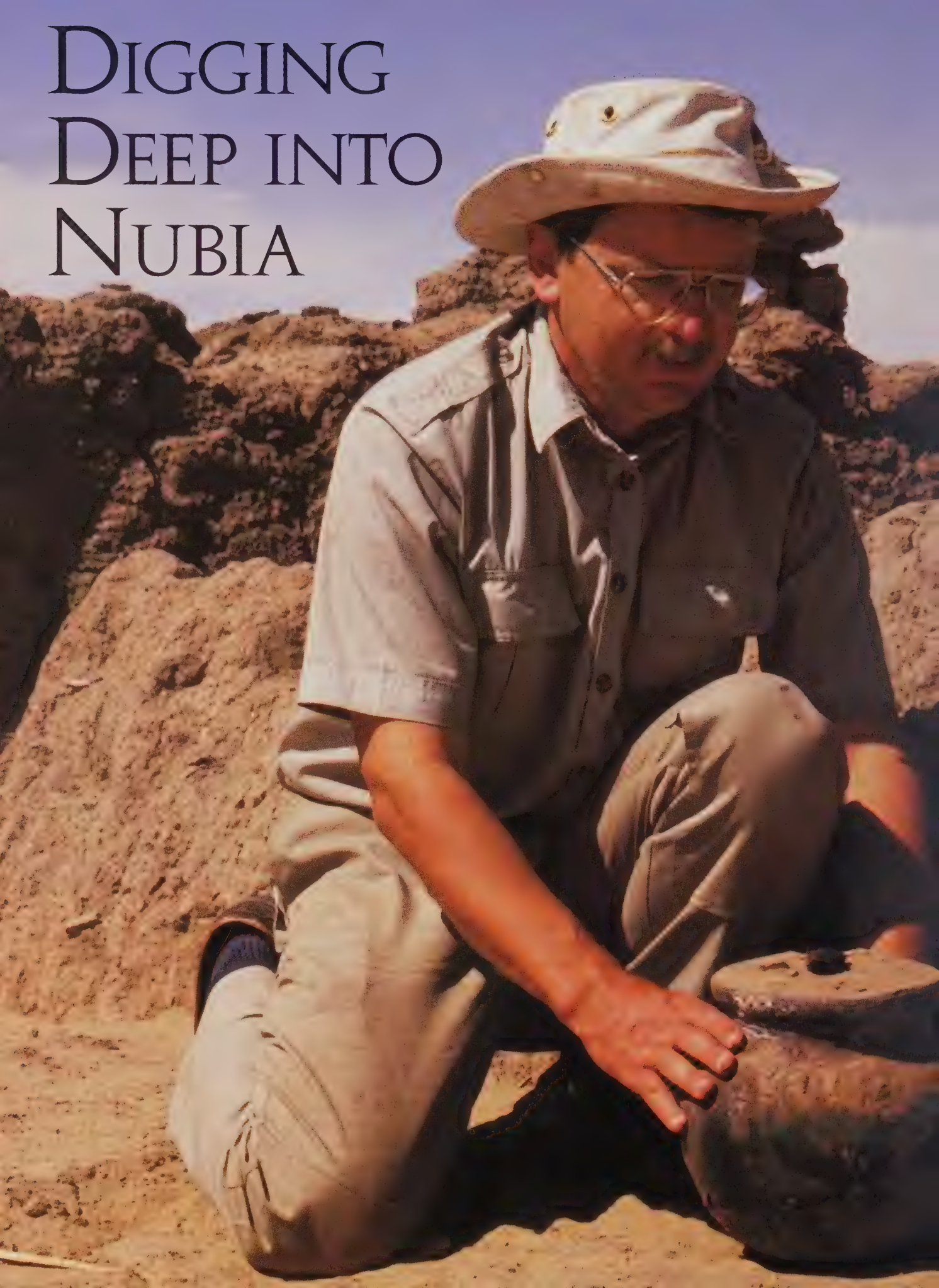
Despite these adaptive differences, a clue to the polar bear's terrestrial ancestry is found in its reproductive behaviour. Unlike brown bears, which hibernate, male polar bears travel the sea ice in search of seals throughout the bleak, dark solitude of arctic winter. Pregnant females, however, return to maternity dens in the fall and remain there for the winter to give birth to their cubs, in the same manner as brown bears who have their cubs during winter hibernation. Upon emerging from their winter dens, females feed voraciously on whelping seals in spring, quickly regaining weight lost during their long fast.

The overall appearance of the white bear has diverged markedly from that of other bears; nonetheless its close kinship with brown bears and its rapid adaptation to life on the frozen arctic seas point to its heritage as the recent mariner.

Charles Jonkel, a grizzly and polar bear expert, the great plains distribution of grizzlies is often misinterpreted. They were abundant along the major drainages, but scarce on the plains. The abundance of bears was likely overemphasized because people generally travelled along the rivers. Today, the plains grizzly bear is officially considered extinct (see sidebar).

The great variety in morphology of bears led early scientists to believe that the taxonomy of bears was quite complex. Modern genetic research has revealed a few simple truths about the origins of bear species. North American bears, which are so much a part of our national heritage and identity, are members of a small group of recently evolved species. Future research on the evolution of bears likely will focus on two subjects: the unresolved relationships of the closely related ursine bears at the top of the family tree and the mysteries of the family's origins at the base of the tree.

Digging Deep into Nubia



ROM research is unearthing the long, complex, and fascinating ancient history of Nubia

KRZYSZTOF GRZYMSKI

Krzysztof Grzymski, leader of the ROM's Archaeological Mission to Nubia, cleans a medieval cooking pot, just unearthed at the Hambukol site in Sudan.

COURTESY K. GRZYMSKI

VISITORS TO THE ROM'S NUBIA GALLERY, WHICH opened in 1992, can view a wide range of artifacts from the Museum's Nubian collection, one of the largest in North America. The artifacts are shown in their historical and cultural contexts provided by the most up-to-date research gathered through fieldwork conducted in southern Egypt and northern Sudan, the region known as Nubia.

Field research has not only enhanced the scholarly quality of the ROM's galleries, but in many instances has led to the enrichment of the collections. In recognition of the Museum's contribution towards saving Sudan's ancient heritage, the antiquities authorities donated a selection of artifacts discovered by the team.

While ROM field activity in Nubia is of a relatively recent date, the origins of the Nubian collection go back to the very beginning of the Museum. It was through two of the Museum's founders, Charles Trick Currelly and Sir Edmund Walker, that the first Nubian objects were acquired. Currelly purchased a small collection of Meroitic period (1st to 3rd centuries AD) pottery in Egypt and later persuaded Walker to support financially the British excavations at Meroe in Central Sudan (1910–1914). In return for this support the newly established museum was given a selection of objects from the Meroe excavations, including a large column base, one of the largest faience objects ever found in the Nile Valley.

This early collection was substantially enhanced through the acquisition of the Gebel Adda material excavated in Egyptian Nubia in the mid '60s by an American team led by Dr. Nicholas Millet, who later joined the Museum in 1970. The National Geographic Society, which funded Millet's project, formally donated the Gebel Adda material.

In 1984 the ROM team was able to begin systematic, annual archaeological investigations of the Dongola Reach region located in Upper Nubia, approximately halfway between the Third and the Fourth Cataract of the Nile. We chose the region for our research because it is an ideal place to look for evidence of influence and contact between the cultivators inhabiting the Nile valley and the pastoral people of present-day Darfur, Kordofan, and Chad. In the continental perspective this area was also a true corridor between the Mediterranean world and sub-Saharan Africa. Most importantly, however, it was in the Dongola Reach region that many of the ancient Nubian civilizations originally developed.

Conducting an archaeological project in Nubia is not an easy matter. In the early years of our program, the logistical difficulties that are to be expected when working in such a place as a desolate part of the Nile valley were further complicated by periods of drought and famine, the civil war raging in the southern part of Sudan, and a devastating Nile flood in 1988. Many archaeological sites were disappearing and much of our activity was devoted

Krzysztof Grzymski is a curator in the Department of Near Eastern and Asian Civilizations

"About thirty villages with beautiful buildings, churches and monasteries, many palm trees, vines, gardens, cultivated fields and broad pastures on which one can see handsome camels"
A 10th-century account of a district near Old Dongola

Excavations are carried out in an area of the Hambukol site, an ancient settlement abandoned centuries ago. Hambukol means "the place of the dom-palm." Today the once lush site is buried by sand.

not to solving purely scholarly matters of the cultural history of Nubia but to identifying and protecting the sites. The combination of scholarly and practical goals was greatly appreciated by the local authorities and by the international community. UNESCO designated the Royal Ontario Museum's project an official activity of the United Nation's Decade for Cultural Development.

Our fieldwork in Sudan was carried out in several stages, reflecting as much the practical and scholarly needs as the available financial support. Thus, from 1984 until 1986 we conducted a rapid surface survey identifying archaeological remains on both banks of the Nile between Khandaq in the north and Debba in the south, a stretch of about 80 kilometres.

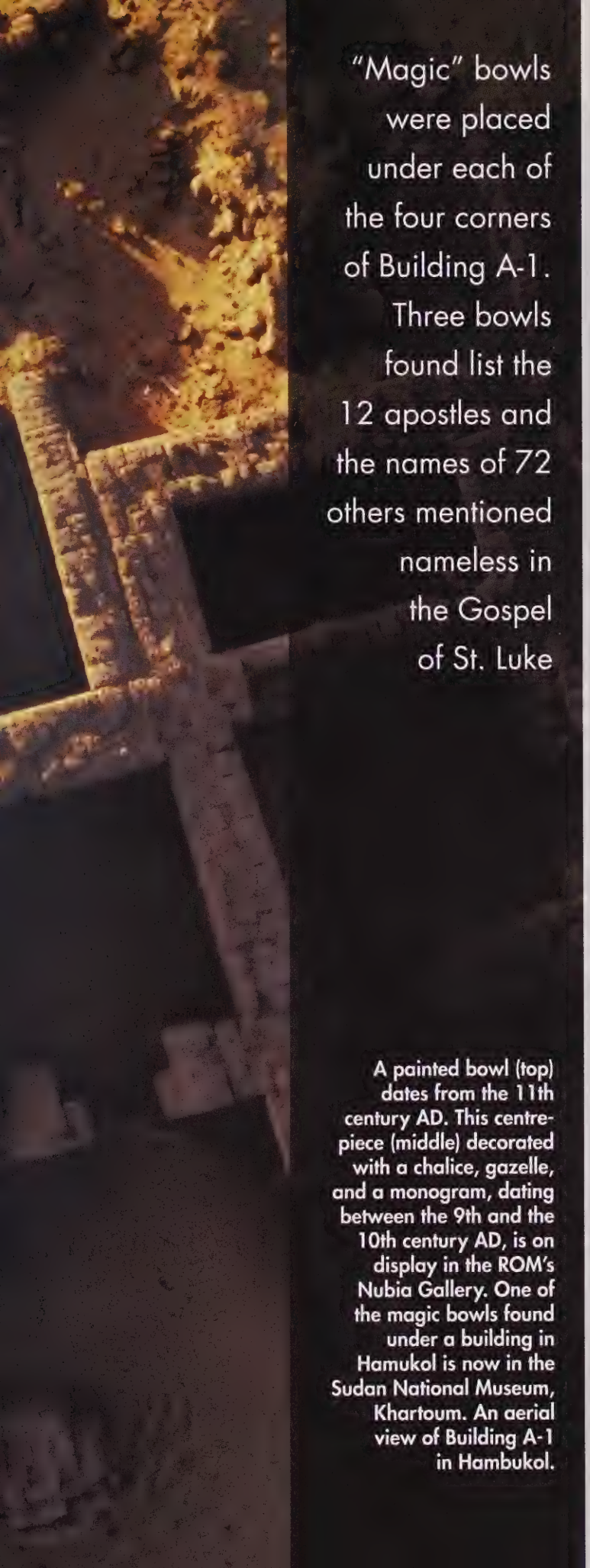
It quickly became apparent that in order to properly evaluate archaeological material from the region one of the sites discovered by our expedition had to be designated as a reference base. Through careful stratigraphic excavation at that site we would be able to distinguish different phases of the cultural development of its former inhabitants and analyse the material remains. The knowledge acquired would then be used to identify and date other sites in the region and to evaluate further the artifacts in the Museum's collection.

In 1986 Hambukol was chosen to be the "type-site." In the Nubian language Hambukol means "the place of the dom-palm." No palm trees grow today on the 14-metre-high and 600-metre-long mound that marks the location of the former settlement, which is about seven kilometres north of Old Dongola, the capital of Nubia during the Christian period (6th to 14th centuries AD). It is one of several large mounds representing ancient settlements that were eventually abandoned by their inhabitants and covered with sand. The presence of these mounds brought to mind the report of a 10th-century Arab envoy and writer Ibn Selim al-Aswani, whose description of the area of Old Dongola mentioned a district of "about thirty villages with beautiful buildings, churches and monasteries, many palm trees, vines, gardens, cultivated fields and broad pastures on which one can see handsome camels."

Excavation campaigns at Hambukol interspersed with study seasons resulted in the discovery of the remains of a well-preserved medieval Nubian town. Several buildings were cleared or partly cleared by our team. While some of them were simple dwellings of ordinary people, others were complex structures whose function still remains a mystery. The first structure that we discovered and named "Building A-1" represents such a mystery.

This large, square building was once covered with domes supported by red-brick pillars, and vaulted roofs resting on white-plastered, mud-brick walls. Under each of the four corners of the structure, the builders placed inscribed bowls. Three of these "magic bowls" were recovered. There were inscriptions on them listing the 12 apostles and 72 other names, which proved to be of great interest to scholars of early Christianity. The inscriptions were studied and published by Dr. Thomas Hagg of Bergen who has convincingly shown that the list named

PHOTOGRAPH BY K. GRZYMSKI



"Magic" bowls were placed under each of the four corners of Building A-1. Three bowls found list the 12 apostles and the names of 72 others mentioned nameless in the Gospel of St. Luke

A painted bowl (top) dates from the 11th century AD. This centrepiece (middle) decorated with a chalice, gazelle, and a monogram, dating between the 9th and the 10th century AD, is on display in the ROM's Nubia Gallery. One of the magic bowls found under a building in Hamukol is now in the Sudan National Museum, Khartoum. An aerial view of Building A-1 in Hambukol.

72 disciples of Christ mentioned, nameless as it were, in the Gospel of St. Luke (chapter 10, verses 1 and 17). According to the Gospel, Jesus gave them "the power to tread underfoot snakes and scorpions and all the forces of the enemy," and the assurance "nothing will ever harm you." As snakes and scorpions are quite abundant in Nubia, the reference was quite appropriate.

Two Hambukol bowls are now in the Sudan National Museum, but the third one was awarded to the Royal Ontario Museum. Similar protective or magic bowls were found previously only in Mesopotamia. Many of them are displayed in the Levant Gallery of the ROM.

Having excavated "Building A-1" we turned our attention to other parts of the mound. As luck would have it we unearthed another large structure, "House B," in an excellent state of preservation. It was a domestic building whose final dimensions are still undetermined, though we have already identified 20 separate rooms, some with colourful murals painted on the walls. This structure stood at least two storeys high and seems to have functioned like an apartment house. Since many doors and windows were blocked with bricks, it appears that the inhabitants abandoned the building in an orderly fashion taking with them most of their possessions except for some hand-made, soot-covered cooking jars, which we instantly named "ugly pots." It is too early to discuss in detail the architecture of "House B" and the ways of life of its former occupants, but through careful screening of the room fill in this and other buildings, we assembled quite a collection of seeds and bones, which provided insights to the diet and subsistence patterns of the medieval Nubians.

Dr. Jock McAndrews and his colleagues, botanists at the ROM, identified the plant remains and seed samples, discovering many species such as olives and vines that are no longer cultivated in Nubia. Dr. Rufus Churcher and Kevin Seymour of the Palaeobiology Department worked on the animal bones. They discovered a large sample of pig bones, an indication of one aspect of the diet particular to the Christian period of Nubia.

This kind of collaboration presents more details of the stories associated with the objects in the Museum collection. For example, we can interpret the symbolism of the decoration on a painted Nubian clay vessel, and describe the system of beliefs or superstitions that it reflects. We can also determine what was eaten from a particular plate, cooked in a bowl, or drunk from a cup.

Apart from the magic bowls and wall paintings, information about the spiritual life in medieval Nubia comes from the excavation of churches. We uncovered one such building on a small mound, or *kom* as it is known in Arabic, situated immediately north of the main Hambukol complex. To date we have only been able to excavate a part of that structure, which may form part of a monastic complex. Unlike the domestic buildings, which were mostly made of sun-dried mud-brick, the "North Kom Church" was constructed with red bricks and stone. Stone columns, surmounted by decorated capitals, were

PHOTOGRAPHS COURTESY K. GRZYMSKI/PHOTOGRAPH BY B. ZURAWSK

erected on a brick-and-stone pavement. One of the stone thresholds had incised monograms that perhaps belonged to high-ranking clergy from Old Dongola. Graduate students from the University of Toronto have been compling research on this architecture.

Exciting though it was, Hambukol was but one of many sites located within a well-defined natural region known as the Letti Basin. In recent years an irrigation scheme has been developed to convert the sandy "island" between the Nile and an extinct river channel known as the Khor Letti into an agricultural zone with new fields and settlements. Therefore, at the request of the Sudanese antiquities officials, and prompted by the research need for a regional study, we began a comprehensive survey of the Letti Basin in 1993. This new project involves a detailed study and mapping of all sites of all periods within the basin, from Middle Palaeolithic (about 100,000 to 70,000 years ago) camps, Neolithic (about 4000 BC) cemeteries, and Kerma-culture (2500–1500 BC) settlements to Islamic-period monuments of a relatively recent date.

As only two brief field campaigns have been conducted so far, it is too soon to describe our discoveries in any great detail. I found myself most excited by the material dated to the Middle Palaeolithic period. Although the Stone Age sites were first noticed during our 1984–1986 reconnaissance, we lacked sufficient expertise to evaluate them properly. In 1994 two experts in the Palaeolithic period joined our team. They were overwhelmed by the material, and their enthusiasm was infectious.

At the time when Middle Palaeolithic people lived in wind shelters or under overhanging rocks, the climate and environment in this part of the world were somewhat different from those of today. Instead of a narrow band of cultivable land along the river and a rocky, sandy desert away from the Nile, there was savannah-like vegetation, and what are now dry river beds (*wadi*) were then filled with water. Life in such conditions must have been quite pleasant. The Nubian sandstone formation is of especially good quality near the Letti area. This seems to have provided an additional incentive for early humans to roam through this area, leaving behind stone tools and debitage: handaxes, scrapers, choppers, cores, and flakes, all waiting to be picked up by archaeologists. Our prehistorians estimated that there may be half a million stone tools, tool fragments, and flakes to be found in the area. Whether the tool makers and users were Neanderthals or some other early humans is impossible to determine at this stage of our research. The answer to this and so many other questions are there for us to pursue in our future work exploring and protecting the remains of settlements of ancient Nubia. ❦

Research for the last two field campaigns in Nubia were financially supported by the ROM Foundation. The University of Toronto, Tilley Endurables, and Noram Capital also provided assistance.

Two experts in the Palaeolithic period were overwhelmed by the material and their enthusiasm was infectious

Mud-brick arches, vaults, and blocked windows were revealed with the excavation of Building B.

PHOTOGRAPH BY K. GRZYMSKI

The superb hu *displayed in the T. T. Tsui Galleries of Chinese Art had an area repaired with unsightly overfilling (left), which was discovered to be exaggerated when the resin was removed by a ROM conservator (right). The resin was replaced and the* hu *properly cleaned, revealing it's true beauty (centre).*

Buyer Beware

THE LATIN PHRASE *CAVEAT EMPTOR* (buyer beware) is as relevant today as ever. In the sophisticated antiquities market, a known provenance for a piece can be worth as much as the piece itself because forgers are increasingly skilled in their work.

Part of their success can be attributed to the highly complicated, expensive analytical and visual examination techniques, now in the public domain, that provide an unprecedented amount of information about the composition of art objects and the technology used to produce them. Forgers can stay one step ahead of their victims by applying this information to their creations. Owners or potential buyers who wish to verify the authenticity of objects should know, however, that many tests for authenticity are destructive in that they require a material sample from the object. Some tests also expose objects to X-rays or other elements that will permanently alter or affect the results of further diagnostic tests such as thermoluminescence.

Since ancient times objects have been repaired and copied. There have always been skilled restorers, and modern materials have facilitated their job. Old repairs, missing pieces, and aesthetically unpleasing areas can be masked or enhanced, often to the extent that they are impossible to detect by the naked or inexperienced eye. Whether the restorations are meant to deceive the buyer or merely to improve the appearance of the object is not the issue. What is important to know is that the odds are firmly stacked against a buyer's getting a better piece than bargained for.

The *hu*, which forms the centre-

PHOTOGRAPHY BY BRIAN BOYLE

piece of the Aspects of Life Eastern Zhou gallery in the T. T. Tsui Galleries of Chinese Art, presents a rare example of an object that is actually superior to what curators thought they had purchased. This bronze wine jar with pictorial decoration of inlaid copper(alloy?), dated Eastern Zhou, 6th to mid-4th century BC, came from a European collection via a reputable dealer. It had a remarkably good pedigree. The original description states clearly that it is "intact as is but for about 40 per cent repair to lowermost register," and "Fourth register should show animals and man-animal combat, with heart-shaped devices containing addorsed pairs of animals below, but this is all but obscured by ancient damage/repair."

Most of the area of the lower register was covered with a modern thermoplastic resin (probably polyester). That did not bode well for the condition of the piece. Generally overfilling such as this means that there is not much under it. The Museum purchased the *hu* regardless of this major repair because it is an important piece and in otherwise good condition.

The overfilling of the lower area of the jar was unsightly, however, and inlaid figures found elsewhere on the piece had been enhanced with an unnatural-looking white material. It was decided in consultation with the curators to replace the resin and to clean the figurative inlay.

The removal of the old overfilling revealed that only about 25 to 30 per cent of the lower register was missing and uncovered a new fanciful figure. The piece was certainly in much better condition than could have been imagined on first inspection. The inlaid areas were also significantly enhanced. The *hu* is now on display in a position of importance that it truly deserves.

SUSAN STOCK
Susan Stock is the metals conservator in the Conservation Department, Royal Ontario Museum

ROM ANSWERS

Dear ROM Answers,
For years, I have been trying to ascertain the origin of a bedroom suite that I inherited from my mother's family. My search through the Metropolitan Toronto Reference Library on Yonge Street proved fruitless, so I've enclosed some photographs in the hope that you may be able to assist.

I can supply a few clues. The suite has a double bed with the headboard measuring 193 cm and the footboard 96.5 cm in height. There is a very worn label tacked to the back of the headboard. Only the words "The Upton Nut Co." and part of the second line " . . . and, O." are readable. The last three letters suggest the end of the name of a city or town, and the "O." may stand for the state of either Ohio, Oklahoma, or Oregon, if in fact, it was manufactured in the United States. The top surfaces of the

If you possess furniture, silver, glass, metalwork, ceramics, textiles, or small decorative objects that may have an interesting past and have aroused your curiosity, this column is for you. Send a clear black-and-white photograph (or 35-mm colour slide) of the object against a simple background, providing dimensions, a description, any markings, or any known details of its history to: ROM Answers, c/o Rotunda Magazine, *Royal Ontario Museum, 100 Queen's Park, Toronto, Ontario, M5S 2C6. Be sure to enclose a stamped, self-addressed envelope large enough to include any photos that we must return to you with the reply.*

Neither Rotunda *nor the author nor any other person who may be consulted assumes any legal responsibility for these opinions or their ramifications. No financial appraisals will be offered. If your query is selected to be published in the column, only your initials and city will appear, in order to protect your privacy. Letters will be acknowledged as staff time comes available.*

dresser are white marble. On each side of the mirror, cone-shaped containers for matches are located below circular shelves for candle holders. The dresser is 221 cm high and 127 cm wide. Its handles may have been moulded as they appear to be identical.

My mother is 82 years old. She and her three siblings were all born in this bed. The bedroom suite was in the Sudbury, Ontario, home of my grandparents when they purchased it around 1900.

Thank you for researching this mystery.

H.P., TORONTO, ONTARIO

Dear Reader,

Judging from your photographs, you own two pieces from a superior quality, late Victorian master bedroom suite. The wood is likely to be black walnut, which was popular for fine furniture in the period, and possibly panels of figured walnut veneer. When looking at furniture made in North America during the period c. 1840-1885, I often consult Thomas H. Ormsbee's *Field Guide to American Victorian Furniture* (New York: Bonanza Books, 1952). It includes detailed line drawings of forms of furniture that were manufactured in quantity, comments on their materials and details, and an assessment of what constitutes rarity and quality. Victorian styles combine elements from so many different periods and sources that it is often difficult to describe a piece.

Ormsbee illustrates a very similar bed, no. 228, which he describes as being in the Renaisance Revival style. This is a style that was based on furniture and designs from the Renaissance in Europe during the 1500s. Often Renaisssance Revival pieces are very ponderous and architectural in form. Ormsbee dates this type of bed to c. 1865-1880 and notes that it was made in black walnut by individual cabinetmakers and factories producing quality furniture. Some of your photographs show that the decorative ornaments are very well carved, notably on the headboard of the bed. The quality of the work and innovative details such as the match pockets suggest that the pieces were made earlier in the style, say about 1870-1875. These are approximately the dates that Ormsbee provides for Renaissance Revival dressers. The dressers that he illustrates are simpler than yours and not as large or elaborate.

I feel that your bedroom suite was likely manufactured in the United States. Similar style furniture was produced by important cabinetmaking shops in large Canadian centres such as Montreal and Toronto. Without shop labels or an original invoice, the origin of furniture of this type is difficult to determine.

Catherine Coyle, a librarian at the Henry Francis du Pont Winterthur Library and Museum, Winterthur, Delaware, suggested that the city and state may be Cleveland, Ohio. Neither Oklahoma nor Oregon were sufficiently settled to produce sophisticated furniture by 1880.

I puzzled over The Upton Nut Co. Large nuts and bolts were very important for holding beds together in the late 1700s and 1800s. That may explain the connection. At Kathy Coyle's suggestion I telephoned the Cleveland Public Library. Ronald Spagnoli of the History Department did a spot check on the city directories and found The Upson Nut Company office and works listed at Scranton Avenue at the intersection of Jennings Avenue in 1884. (The damage on the card on your bed may have made the "s" of Upson look like a "t.") The company is described as a bolt and nut manufacturer. Its head offices were in Unionville, Connecticut, with A. S. Upson, president, S. Frisbie, secretary, and, in Cleveland, H. S. Allen, agent, and L. A. Gleason, superintendent. It is possible that someone from the Cleveland branch of The Upson Nut Co. owned the bedroom suite or was responsible for storing or shipping it.

I have often been amazed at the quality of the carved handles with leaves, fruit, nuts, etc., found on dressers and chests of drawers of this type. Ormsbee illustrates a similar "leaf-carved handle," no. 277, on page 420, and states that they were most frequently carved from black walnut or maple but on certain pieces could be rosewood or mahogany. I suspect that the uniform quality is the result of using a carv-

ing machine that could make each one identical. I cannot recall seeing one in any type of cast composition, though materials like early plastic (found in photograph cases) and gutta percha were then available for casting novelties.

How might such a bedroom suite have ended up in Sudbury, Ontario? It is possible it was brought by someone prominent who came to live there. In the 19th century, transportation was expensive, and people often sold the furniture when they sold their home. Sometimes it was sold at auction; sometimes it stayed in the house. You are fortunate to own this set. It seems to have been well taken care of by your family for the last three generations. I hope that you will enjoy it for many years to come and pass it down. Thank you for your letter.

PETER KAELLGREN,
ASSOCIATE CURATOR
DEPARTMENT OF WESTERN
ART AND CULTURE

Dear ROM Answers,

The enclosed photos are of a child's plate that was in my father's family. My father emigrated from County Antrim in Ulster in the 1920s but I do not know the origin of the plate. It has a sticker on the back that reads: "131 years old—1926." The plate is 12 cm in diameter.

The letters of the alphabet decorating the front of the plate are raised, and the letters "N," "S," and "Z," are backwards. The picture of the boy on a swing is in good condition, except for his left foot, which is wiped out. This flaw may have been in the painting or the transfer, if one was used, because there is no sign of surface deterioration.

There appears to be no marking on the back, although there is a bit of indentation in one spot, which looks to me like roughness in the mould. I have not lifted the date sticker to see what, if anything, is underneath. I hesitate to do anything with the plate until I know what I am dealing with. Thank you.

J. O. T., TORONTO, ONTARIO

Dear Reader,

Old pieces of ceramics turn up from time to time with paper labels on the back. Sometimes they relate to family matters or the original owners, as is the case on your plate. In other instances, the papers are labels or notations made by earlier collectors. The information written on these labels is not always reliable.

Small plates with a relief border showing letters of the alphabet were produced by a number of potteries in England, Wales, Scotland, and possibly even Ireland during the 1800s. They were made as inexpensive gifts for young children. Small ceramic mugs with scenes, animals, mottoes, children's names, and sometimes letters of the alphabet were also made for the same market. Most were crudely potted and decorated with coarsely printed transfer prints. The reversed lettering is typical of production standards. Quality control was not the main concern because these pieces were manufactured to be sold for a few pennies to ordinary consumers.

Although the majority of the surviving examples appear to date from about 1820 through to 1850, I would date your small plate to around 1860 because of the boy's costume. He is wearing what appears to be a highland bonnet with plumes. Highland costume began to influence popular British fashion around 1850, largely as a result of Queen Victoria's establishing Balmoral in Scotland as one of her principal residences. She and her family wore highland dress there. Tartans, which at one time had been considered unpatriotic by the English because of the uprising led by Bonnie Prince Charlie in 1745, became part of the wardrobe and were even used to some extent in interiors.

Your plate was sold in spite of a chip on the rim and a blemish in the transfer print around the left foot of the figure. This suggests that it was probably made by one of the smaller potteries and/or was part of a very low-cost consumer line. On a number of occasions, I have seen objects, particularly small examples of inexpensive ceramics for children, that people have told me were associated with relatives who emigrated to Canada. Your father's treasuring of this object is not an isolated phenomenon.

Today, some collectors specialize in such children's items that often reflect 19th-century attitudes to childhood. My favourite from all of the examples that I have seen was a plate about 10 cm in diameter with a transfer-printed scene of a boy in a landscape and the lettering "SHUN BAD COMPANY" below.

It is unlikely that your plate is marked. Of many hundreds of examples, I have seen only one or two with factory marks. They were simply too common to be labelled, and labelling would only have added to the cost, making them less saleable. Thank you for writing.

P. K.

Jade, Netsukes, Photos of Japan, Ancient Egypt, Marius Barbeau

AS COLOUR PRINTING HAS EVOLVED over the decades, the purely textual component of art books has become more slapdash, pretentious, and often annoying: a generalization, I know, but one that seems valid enough to a person like me who sees hundreds of art books in a year. What a pleasure then to find Roger Keverne's **Jade** (Raincoast, $85). There can be few books as big, colourful, and expensive as this that are also so thoroughly researched, well thought out, and nicely written. Although a lovely piece of bookmaking and design, *Jade* is primarily valuable as a gathering of articles by various jade experts around the world, including one former scientist with the Geological Survey of Canada and the jade experts of both the National Palace Museum in Beijing and the National Palace Museum in Taipei, two institutions that almost never condescend to acknowledge each other's existence.

I also strongly recommend *Jade* as a visual experience. Its documentary photography is excellent. Particularly compelling are shots of the sort of objects that, for most of us, flash through our minds when we hear the word *jade*—those luxurious translucent pieces of what is often called imperial jade.

Jade is used to describe two different types of mineral: jadeite and nephrite. Both vary in colour from almost emerald green to soapy white, depending on which trace minerals are found in a particular deposit. Chromium, for example, is necessary to make jade green.

But the two types are fundamentally different substances, a fact discernible by the eye when pieces of each are chipped or broken open to reveal dissimilar textures, which is to say, molecular structures. Jadeite is without question the more desirable of the two, among artisans as well as collectors and dealers, because of its richness, its ease of handling, and its surprising toughness. This gem is found in Myanmar (the former Burma, which still produces the most hotly sought-after jade) as well as in China and Japan—but also in Guatemala, where Maya culture made elaborate use of jadeite for weapons as well as jewellery.

By contrast, nephrite, also called new jade and other names, occurs in Central Asia and New Zealand but also in more northerly latitudes, including parts of Siberia and British Columbia. Nephrite has become more common as many of the major sources of jadeite have disappeared because of political disturbances or simple mismanagement of the resource.

In addition, various other factors make the products of certain schools of craftsmanship (individual artisans' names are almost never known) desirable for a while. In the period from about 1960 to 1980, for example, jade from the workshops of Taiwanese carvers was considered particularly important. Among gemologists, lapidaries, and collectors, word spread just the way word about an especially fine Beaujolais Nouveau would run through the oenophile underground.

Keverne's approach to the book—assembling a team of specialized contributors—works much better here than is usually the case, no doubt because these are true scholars and curators, Chinese, Japanese, British, American, and others, working together to produce a set of almost interlocking essays that survey the field in a common diction and without repetition.

For example, Angus Forsyth, an important British collector, discusses Chinese jade in Neolithic times and the evolution of *yu*, the Chinese ideogram for jade (literally, "carvable stone"), as in the Chinese expression "smashed jade"—meaning a heroic death in a noble cause. For her part, Daphne Rosenzweig, an American professor, tries to devise a simple but reliable system for evaluating jade carvings. Russell Beck, a curator from New Zealand, tells the surprising story of jade in Maori culture, while Robert Skelton of the Victoria and Albert Museum in London distils his life-long study of jade in the Islamic world. And so on. I learned something from every page.

Jade comes with a full set of apparatus—a glossary, an up-to-date international bibliography, and a country-by-country listing of the public institutions with the most significant collections. The concentrations follow the map of wealth as well as certain cultural lines. There are deemed to be 68 top collections in the United States, 12 in China, nine in Germany, eight in Mexico—and four in Canada. One of them is of course at the ROM. The others are at the Musée des Beaux Arts in Montreal, the Art Gallery of

Greater Victoria, and the relatively little-known British Columbia Minerals Museum, also in Victoria.

SOME OTHER NEW BOOKS OF INTEREST to *Rotunda* readers:

• The English translation of the Japanese word *netsuke* would be *toggle* or maybe *fob*. As Edwin C. Symmes says at some length in **Netsuke: Japanese Life and Legend in Miniature** (Raincoast, $37.50), the word refers to very small intricate or elaborate carvings, sometimes of human figures, sometimes of mythological signs and creatures, which in an earlier age were worn with the kimono. As the kimono had no pockets, one carried some type of purse or pouch suspended on a cord; the cord was passed over and under a sash at the waist and was tied off with a *netsuke*. Symmes discusses this tradition and uses about 70 illustrations. While some of the objects seem genuine miniature works of art, others will strike western readers as being closer to the knick-knack tradition. No matter. The important point, as always, is that a healthy and humane society values craft over mass production and puts a premium on beauty in the design of everyday objects.

• Centuries before *netsuke* came into being, Japanese carvers were being called on to produce masks for various types of theatrical performances: for example, the three-quarters life-size masks familiar from Noh theatre. Even today this is still an important area of Japanese craftsmanship. "The stage mask carver is as much a painter as a sculptor," writes Raymond Bushell. "Of the average 40 or so working days it takes to produce a single mask, he devotes as much of the time to painting and polishing as he does to carving." For as long as *netsuke* have been needed, some of them have been miniatures of these stage masks—differing not only in size from the originals but also in the fact that most *netsuke* masks are stained and polished, not painted. A decade ago Bushell produced an interesting study and collectors' guide on this *netsuke* sub-specialty. It went out of print but has appeared now in a new edition as **Netsuke Masks** (Raincoast, $108), a large (but not too large) book, fully and tastefully illustrated, presented in a well-made ornamental slip-case.

• Because Japan was virtually closed off to outside cultural influences for hundreds of years until the arrival of the American fleet in 1853, there is something wonderful and strange about many of the photographs in Terry Bennett's **Early Japanese Images** (Raincoast, $40), which covers the period up to 1912 and deals first with foreign photographers in Japan and then with the native ones who slowly came to prominence. To see the hard faces of the samurai gentlemen before they were defanged in 1869 is to get a sense of how they carried themselves in the world, to know instantly that they *are* gentlemen because they wore both the long and the short swords, and to be transported far back beyond the horizon of individual human memory. So it is too with the graceful sepia-toned groupings of bath-house women, so different from anything that we would now call soft-core pornography as to be not pornographic at all, by anyone's definition. A useful companion book for comparative purposes is Bennett's **Japan Caught in Time** (Raincoast, $34.95), which is based on the collection of photographs made by a Russian scientist who went to Japan in 1879. They have the same appeal as the images in the other book, though the human models seem stilted somehow —over-posed. In fact, this particular photographer (a botanist named Alexander Vasilyevich Grigoryev) was interested as much in landscapes and buildings as in people. This fact in turn brings another new book to mind.

• Before the arrival of Commodore Matthew Perry's "black ships," the only foreigners in Japan were Dutch traders confined to Deshima, an artificial island at Nagasaki. Through these Dutch merchants, the Japanese knew, as early as 1839, of the French photographer Louis J. M. Daguerre's great invention, the daguerreotype. By stabilizing and preserving what the eye saw, daguerreotypes pretty much revolutionized ways of looking at the everyday world as well as ways of making and approaching art. Therefore daguerreotypes, which flourished for a relatively short period before being replaced by newer, more exact, less cumbersome photographic methods, are almost always fascinating. They are the baby-pictures of photography itself as well as a slim link to persons (or places) long dead. Daguerreotypes were used primarily for portrait work. But their value in art, especially with respect to scenes from classical antiquity and architectural studies, should be better known. That's why John Wood's book **The Scenic Daguerreotype: Romanticism & Early Photography** (University of Iowa Press, US$55) is so attractive and so useful. It is a corrective and thoughtfully designed influence.

• Because of the importance of funeral rites and mummification in ancient Egypt, the world today knows far more about how Egyptians prepared for death than about how they felt when they were still alive. As compared with Greece or Rome, for example, precious little information about medical and health practices in Egyptian culture has survived. But some has. Just enough for John F. Nunn, a retired British medical researcher (and amateur Egyptologist) to make a short interesting book entitled **Ancient Egyptian Medicine** (University of Oklahoma Press, $US39.95). Only about a dozen important medical papyri have come down to us. The copies themselves cover the period from approximately 1550 BCE to 250 CE (the actual texts are more difficult to date) and it's not possible to know how completely these chance survivals represent their culture's knowledge of the subject. Certainly some are rather general, such as the Hearst Papyrus (found by an expedition financed by

William Randolph Hearst's mother) or the so-called Edwin Smith Papyrus on surgery (after the American collector who purchased it in the 1860s). Three of the dozen deal with gynaecology wholly or in part. A papyrus called "Brooklyn Snake" (because it's owned by the Brooklyn Museum of Art) is specific to snakebite—which, the study of hieroglyphics and burial practices already teaches us, was a potent danger in the culture along the Nile; this papyrus, written in Middle Egyptian, is thought to date from the 13th Dynasty or possibly the early Ptolemaic Period.

• Dr. Nunn's book is profitably read in tandem with **Hieroglyphs and the Afterlife in Ancient Egypt** by Werner Forman and Stephen Quirke (University of Oklahoma Press, US$39.95). As I was using them both, I found it useful to keep at my elbow another title from the same publisher, **A Biographical Dictionary of Ancient Egypt** by Rosalie and Anthony E. David (US$16.95 paper). And anyone even remotely interested in Egyptology will welcome the reappearance of Margaret Drower's biography **Flinders Petrie: A Life in Archaeology** (University of Wisconsin Press, US$40 cloth, US$17.95 paper). Sir William Matthews Flinders Petrie (1853–1942), whose own memoir, *Seventy Years in Archaeology* is one of the most enjoyable books on the subject for the general audience, was already famous for his work at Stonehenge when he turned his attention eastward and became the father of modern Egyptology, a subject he taught at Cambridge from 1892 to 1933. This readable biography by Drower, who is probably one of his few remaining students, tells the story of great accomplishment carried into extreme old age. She makes skilled use of Sir Flinders's diaries and journals.

• A new Canadian biography *Rotunda* readers won't want to overlook is **Marius Barbeau: Man of Mana** by Laurence Nowry (NC Press, $27.95 paper). Barbeau (1883–1969) was of course Canada's great pioneering folklorist, variously famous for his work on West Coast Native peoples and on the Iroquois and Huron cultures, for the way he brought science to the study of Quebec folksong and customs, and also for his helpful associations with Canadian painters as different as Emily Carr and Jean-Paul Lemieux and many other artists working in other media as well. Some readers might prefer a book closer to the standard narrative and interpretative biography based largely on the study of the subject's voluminous writings. But when the idea for a book on Barbeau resurfaces, as it will again one day, the author or authors will be grateful to Nowry and the fact that he began so long ago to record the reminiscences of many who knew Barbeau over the years.

DOUGLAS FETHERLING
Douglas Fetherling is book review editor of Rotunda

ROTUNDA
the magazine of the Royal Ontario Museum

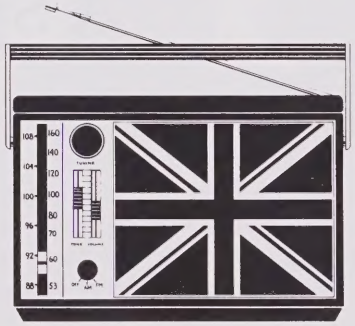
In the February issue of *Rotunda*...

The Truth About Lemmings

By Mark Engstrom

Royal Ontario Museum
100 Queen's Park
Toronto, Ontario M5S 2C6
(416) 586-5590

JOLLY GOOD NEWS



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A Spicy Tale

A SMALL SPICE BOX DISPLAYED IN THE ROM'S JUDAICA GALLERY IS DECORATED with miniature paintings of Biblical stories. Pictured here is King David standing on the roof of his palace and catching a first glimpse of the beautiful Bathsheba while she is bathing. According to II Samuel, Chapter 11, Verse 2, David has Bathsheba brought to the palace where he seduces her. She becomes pregnant. David sends her husband, Uriah the Hittite, into battle where he is killed. David then marries Bathsheba. Needless to say, God is angered by David's actions. Read the Bible to find out the rest.

PHOTOGRAPH BY BRIAN BOYLE

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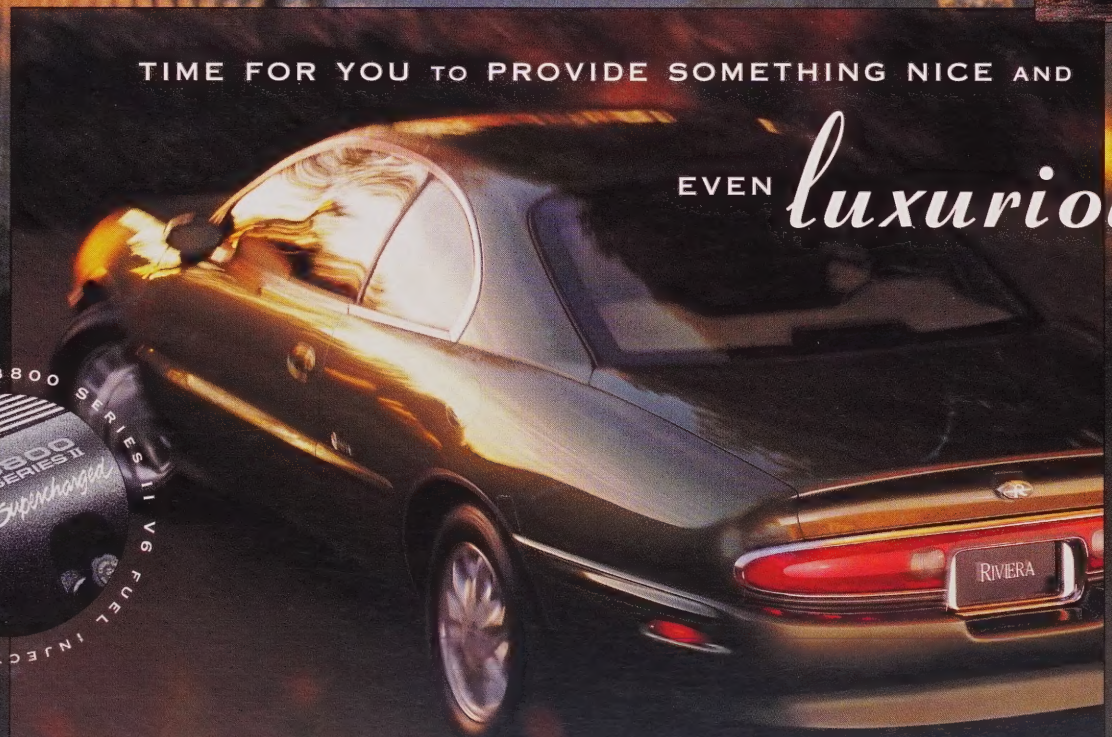
TIME FOR YOU TO PROVIDE SOMETHING NICE AND EVEN *luxurious* FOR YOURSELF.



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